Notebook Series -- Notebooks by Edison
Notebook, N-19-08-26

This notebook is a continuation of N-19-06-18. It was used by Edison during the period August-September 1919. Included are descriptions of numbered electrolytic and chemical preparations, some marked "Ford" if they appeared promising for use in starter batteries for Ford automobiles. There is also a crossed-out list of projects entitled "Experiments to be carried out," with notations regarding projects to be assigned to specific laboratory employees, along with others to be performed by Edison. The list begins with "copper oxide plate" and "Ford starter battery" but includes experiments with electromotographs, audions, and "XYZ devices," as well as electroplating, ore separation, sound recording, and chemical reclamation experiments. The list is transcribed and amended in N-19-09-09. Some of the experiments pertain to Lalande-type primary batteries and to preventing the shrinkage of copper oxide plates. Others involve solutions saved from nickel plating experiments. In addition, there is a list of "chemicals in the dumpy bottles in showcase." The entries in this book reveal the convergence of Edison's work on battery and disc record manufacture in terms of electroplating. The notes indicate that Edison's brother-in-law John V. Miller assisted in some instances. The front cover is labeled "General Book Experiments No 3 Typed." A notation on the flyleaf states that the entries in this notebook were "all entered by typewriter." The pages are unnumbered. Approximately 100 pages have been used.

All Entered by Typewriter

Aug 26 1919

180 — ~~Peeled~~ NG

136 Lithium Citrate
Sol clear anode clean
Not peeled, one edge shows slight raise, White Matte.
Lays nearly flat colour chipped off VERY Tough

142 6. Lithium formate
Sol clear anode clean
Self. peeled in liquid
probably KL1 mem - Spongy + TOUGH

160 6 Cobalt Chloride
Sol dark anode black deposit - Cathode
Chipped Easily NG

133 6- Lithium Acetate
Sol cloudy anode clean
Stripped Easily + part
deplated Sputtered to Cathode
TOUGH.

#11 = 6 Mixed Silicafluoride - ??
Sol clear anode clean
Allsplit longitudinally
NG.

146 6 Lithium Sulfite
Sol clear anode clean
all split up NG

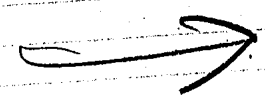
94 - All split longitudinally
6 Ethylpyrene -
NG
Sol clear anode brown
deposit,

80 6 Methadinotrabromal
sol clear anode clean
Black streaky dont agree
Gr any ! nickel deposited
NG —

271 or 291 - 6 Calcium Citrate
sol clear anode clean 5 5
All split brittle, 1 1

163 - 5 6 Cobalt Bromide
sol clear anode clean
Split bad along lines
of record & even on smooth
part same curve Tough.
But NG

141 6 Lithium Fluorsilicate
Split off probably 30
min NG Very Brittle
Sol. clear anode clean



274 Magnesium Citrate
Sol clear anode clean
Perfect not peeled on
split bright matte
Comes off flat VERY Tough

95 - 6 Benzyl alcohol
Sol clear anode clean
Grows reddish deposit
of brittle metal fuming red sludge
NG

97 6 Butyl alcohol
Sol clear anode clean
All peeled early Very
Brittle NG

252 6 Zinc acetate
Sol clear anode stained slightly brown
Very thin deposit, dark
+2 Brittle breaks up to chips
1/32 by scraping with
knife — NG

129- 6 Uranyl nitrate Fluoride
Brittle, flecked pbly
40 min / NG
sol clear anode clear

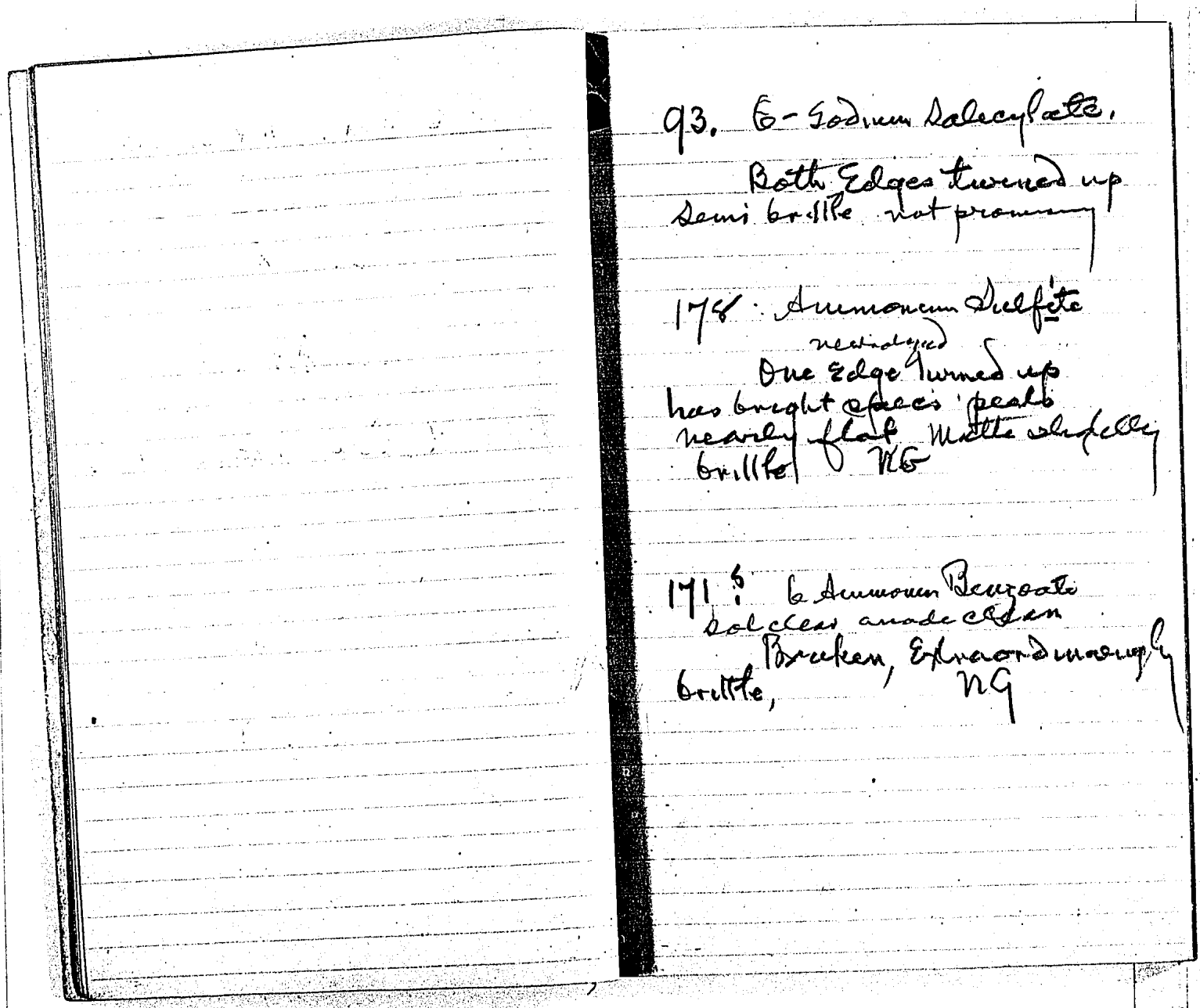
210 ? Sodium Rosalate, - greased
sol cloudy anode stained Red
Horrible brittle skin,
stripped off Easily / has red
streaks like 95 NG

216- 6 Sodium Peroxyphosphate
sol clear anode clear
Very brittle flecked pbly
20 min - red color NG

269 6 Cobalt Citrate -
Sol clear anode clean
Perfect, perfect edges all
over, but when stripped it curled
up to a tube VERY Tough
it gassed

173 6 Ammonium Bromide
neidual
Turned up a little at one
Edge has peculiar glistening
dots on outer surface
peels + lays flat Its Grittie
About same as regular -
Sol clear anode clean

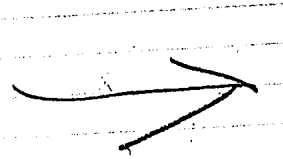
#2 fe ferrum sodabrate
peeled about 4 5 mm
Whole 1 ½ 1/2" turned up
also little of balloons
Comes off flat flattest yet
but its very thin plating
probably 1/2 that it is ranked
be a little brittle -
Sol clear anode clean

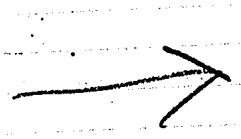


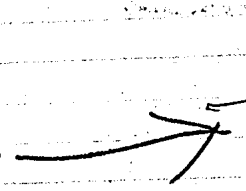
93. 6- Sodium Salicylate.
Both Edges turned up
Semi brilliant not pronounced

178. Ammonium Sulfate
neutralized
One Edge turned up
has bright specs pearly
nearly flat Matte shade
brilliant NG

171 ? 6 Ammonium Benzoate
Colorless anode Cedar
Bracken, Extraordinarily
brilliant, NG





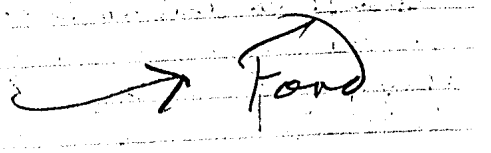


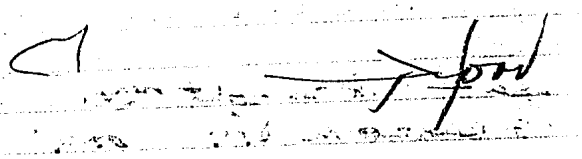
102 - 6) Aluminum Bromide
Ventilated Soldiers smoke clean
.020 green hydroxide for
very adherent for Ford
blackish

103 - Aluminum Chloride 5%
Can't make neutral
Green hydroxide but
greenish + not so good
as 102 Cloth + some came
off in the bath Evidently
~~Dip into [illegible]~~
~~[illegible]~~

253 : Zinc Bromide - 5%

Very dark very adherent
but there are places where
pieces have flaked off





165- 6 Cobalt Nitrate
Sol dark anode clear
perfect even deposit
black & probably .020
thick edges good, porous
fine for Ford

259 - 6 K Permanganate
Sol dark anode stained violet.
Then coating of
reddish most has fallen
off — it might adhere to
Ni without S/4 Soy

262 6 Sodium Bichromate
Sol clear anode clear
Nothing on it at all

→ 7ond

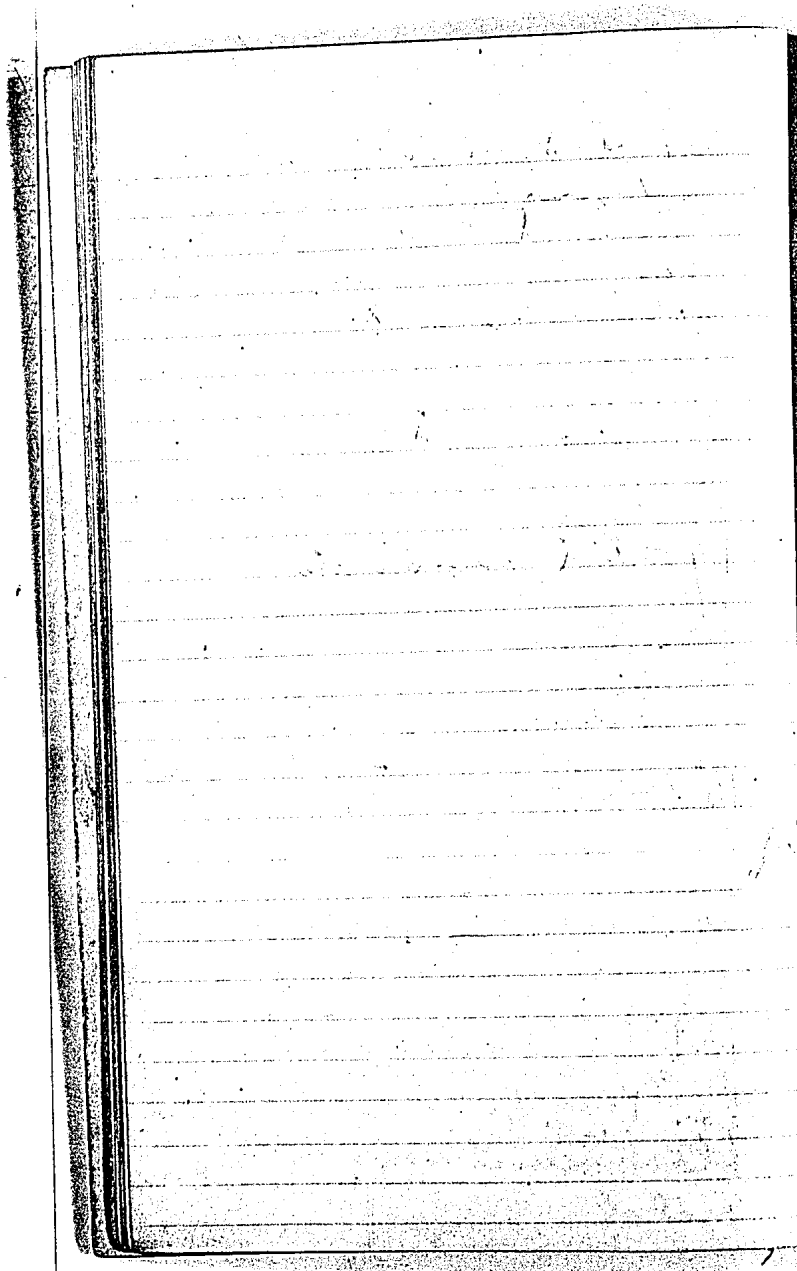
or Nitrate

264 6 Sodium Nitrite
Sol cloudy anode clear
Very fine deposit about
020 Very tenacious Black
nothing comes off to
darken the finger
GOOD — 2 chipped
of pieces near top —

17 = 6 Cadmm Sulfate
Part metallic Mirror
over that a black Mud
sol clear Anode clear NG

152 - 6 Cadmium Fluoride
Very thin deposit of
black NG
Sol cloudy anode clear

151 6 Cadmm Chloride
sol clear anode clear
Very thin deposit
black Contrary from any
metal

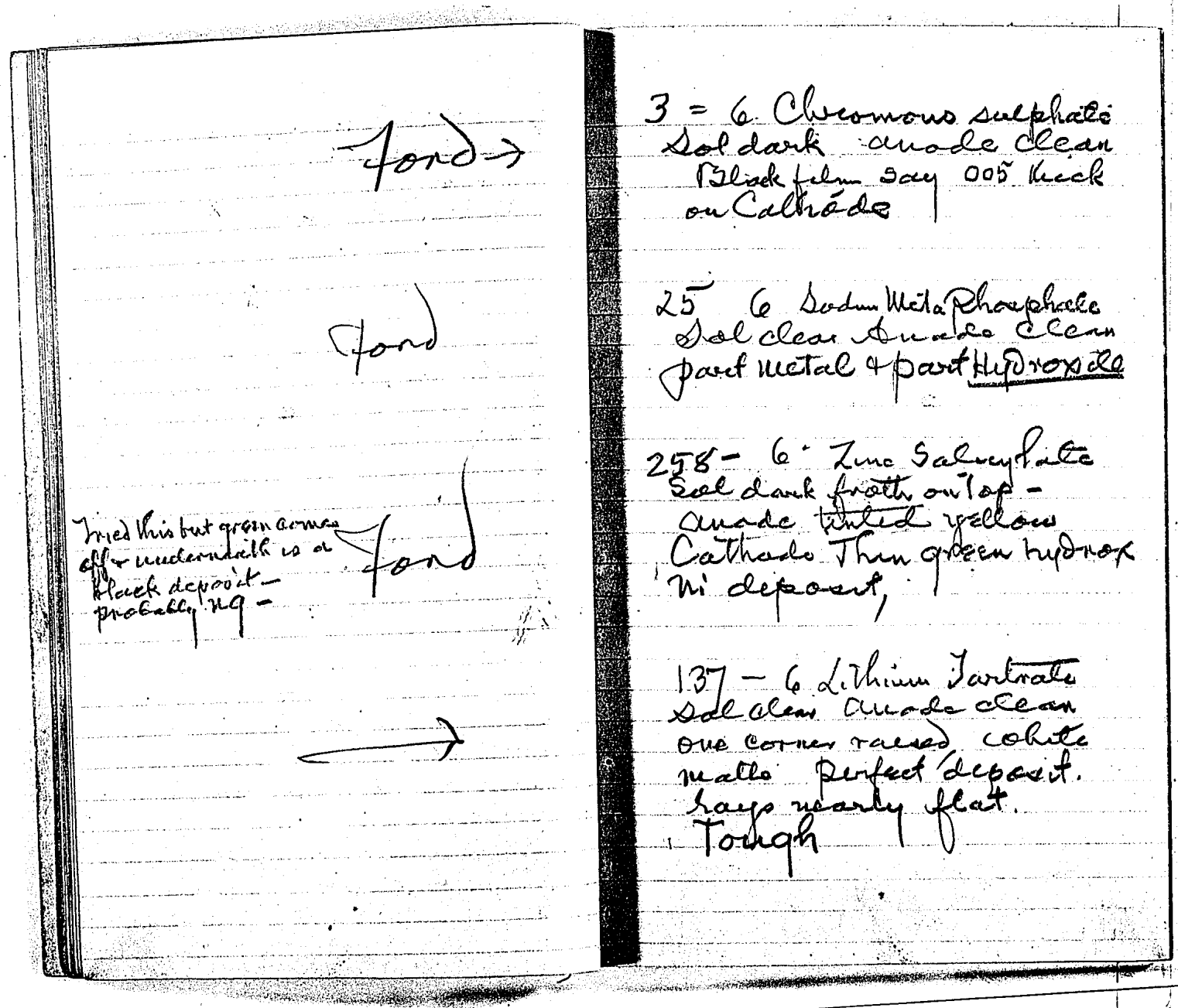


255 or 234 6 Zinc chloride
Sol cloudy anode clean
dark deposit very
thin may be some metal
look at up

256 — 6 Zinc Nitrate
Very thin ~~Nr Off~~ Zn
Sol clear anode clean

170 6 Ammonium acetate
sol clear anode clean
Peeled Early in the hour
Very brittle.

111 — 6 Lithium Borate
neutral. Sol clear anode
has black deposit on part
of it Peeled Early, Cracked
Very brittle.



Tond →

Tond

Tried this but green comes off underneath as a black deposit — probably Ag —

Tond

→

3 = 6 Chromous sulphate
Sol dark anode clean
Black film 3 day 005 Rock
on Cathode

25 6 Sodium Meta Phosphate
Sol clear Anode clean
part metal & part Hydroxide

258 - 6 Zinc Salicylate
Sol dark froth on top -
Anode tinted yellow
Cathode Thin green hydrox
Ni deposit,

137 - 6 Lithium Tartrate
Sol clear Anode clean
One corner raised white
matte Perfect deposit.
Lays nearly flat.
Tough

134 – 6 – Lithium Benzoate
Not peeled. White matte
after coming off flat –
TOUGH,

260 – 6 – Na Hypochlorite
anode clean Sol clear
all curled up brittle

113 – 6 – Silicofluoride of Ni ?
or what, Sol clear
anode clean – bad deposit
around Edges, thin – laughs
Not promising

221 – 6 – Mannite,
Anode clean – Sol cleary
Bad Edges ~~Became~~ brittle

177 – 6 – Ammonia Oxalate
Neutral – Sol little cloudy
Anode clean – 4 Edges curled
up – about 45 min before burning
2 gms – film flat no spring Very brittle

Phenomenon

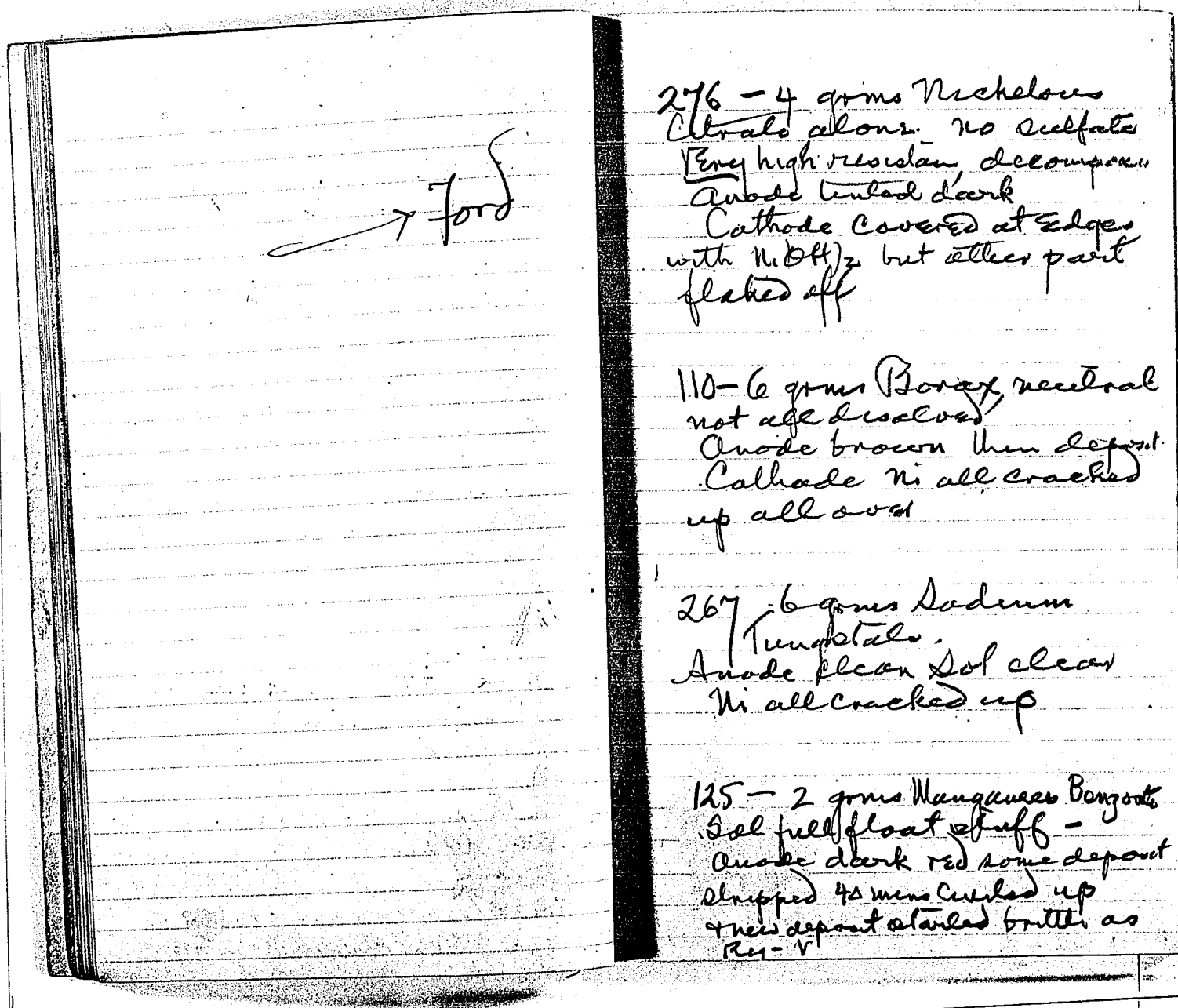
Note
deposit Colorado
Solar K Colorado

272 6- Potash Citrate
Anode clean Sol Clear
Peeled Early - Tough -
White Matte —

Tried plating # 122
Magnesium Nitrate put on 1"
1/32 hole nickel grid, it flakes
off at 100 ma density.

117 - 3 gms Hydroquinone
Solution clear except floating
Crystals, Spangles
Anode clean
Nickel wont crackup yet

261 - 10 cc Saturated
Bromine water
Anode clean Sol clear
Ni little Cracked all along
Edges. About as Ex. 116 as,
Reg White matte lays dead
flat - Varnish wrinkled
by the Bromine + made
white but still OK -



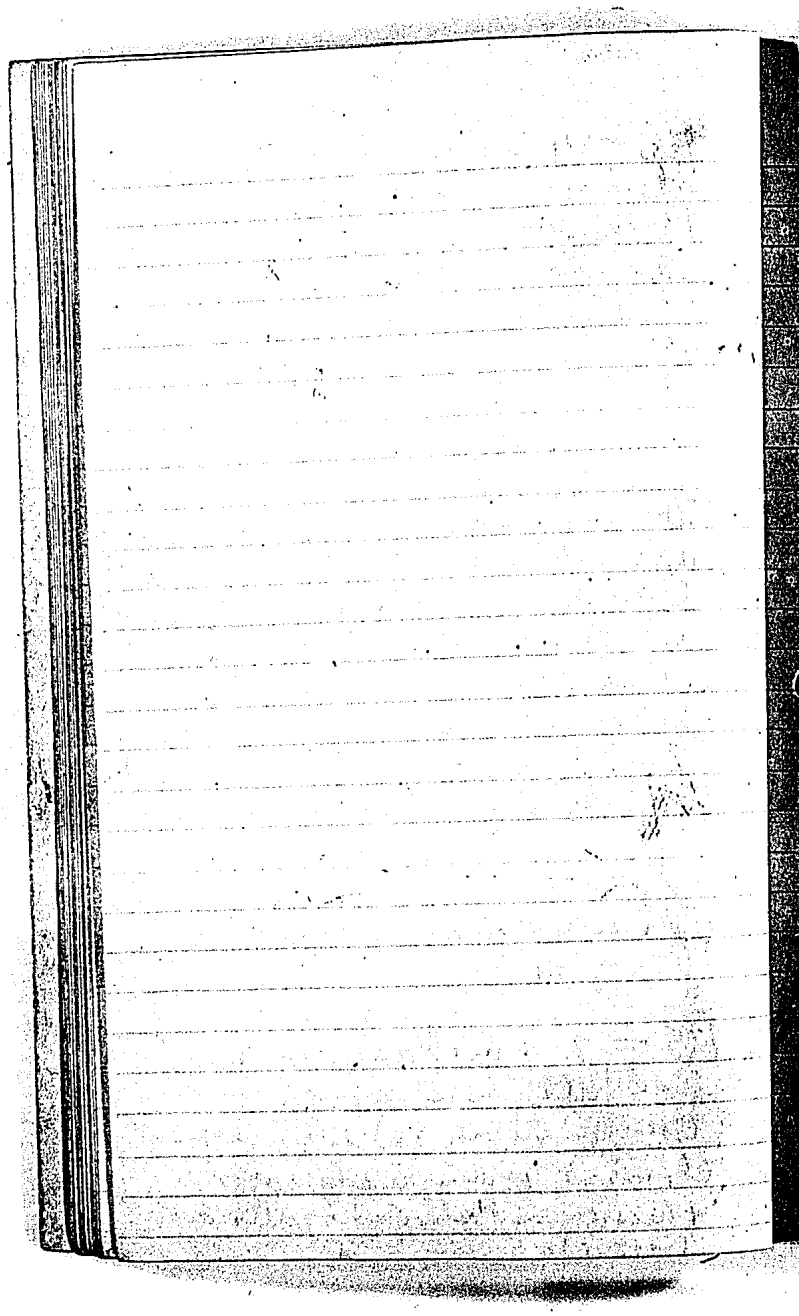
→ Ford

276 – 4 grms Nickelous Citrate alone. No sulfate Very high resistance decomposes Anode tinted dark Cathode covered at edges with $Ni(OH)_2$ but other part flaked off

110 – 6 grms Borax, neutral not adj desired Anode brown thin deposit Cathode Ni all cracked up all over

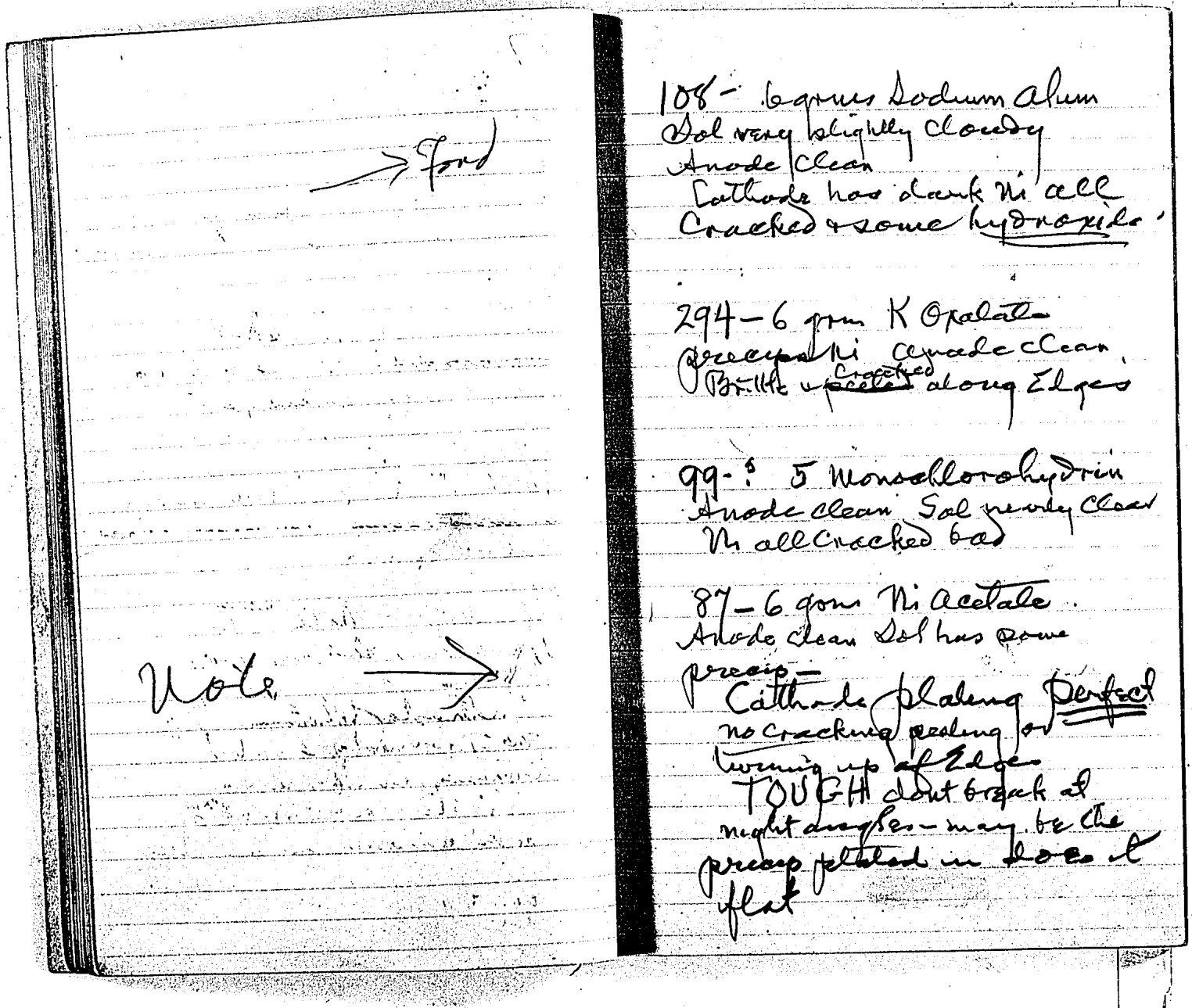
267 – 6 grms Sodium Tungstate. Anode clean Sol clear Ni all cracked up

125 – 2 grms Manganese Benzoate Sol full float stuff – Anode dark red some deposit Stripped 45 mins Cracked up + new deposit started brittle as Rey – V



Experiments to be carried out
Aug 27 1919

Copper oxide plate - Hart + req mix
Ford Starter battery. Burns, Hanley, Lott, Elec Knecht, Edison
Audion 1 2 & 3 Nobs cell-battery - Edison
~~Regeneration Cir - Ni Carbonate - Dolezalek~~
" Old cell nickel mix "
Rapid Copper plating - Edison
~~Nickel " Edison OK~~
Emg + Chalks Hanley - Frodsh
~~Discard Nickel for Worthington Mould, Stanwell~~
~~Separating Cir from Ni~~
New Blank processes, Dolly Dunnoldson
~~OK Virginia returned Anderson Co Nom~~
Automatic Measurements, Experimental
Long tunnel Experiments recording, Exposure
Safe powder in Cake plating
+ improvements to Chesapeake
Hard rubber battery parts -
Lithium process. Edison
X Y Z devices -
Separating Ni + Cu from Sudbury ore
Using Zinc + Soy Meal as Water proof
Ag Sol Chambers A from Young Dolezalek
8/4 drawn Mfg sheet Ni 0001 to 004
for sale Continuous if possible.



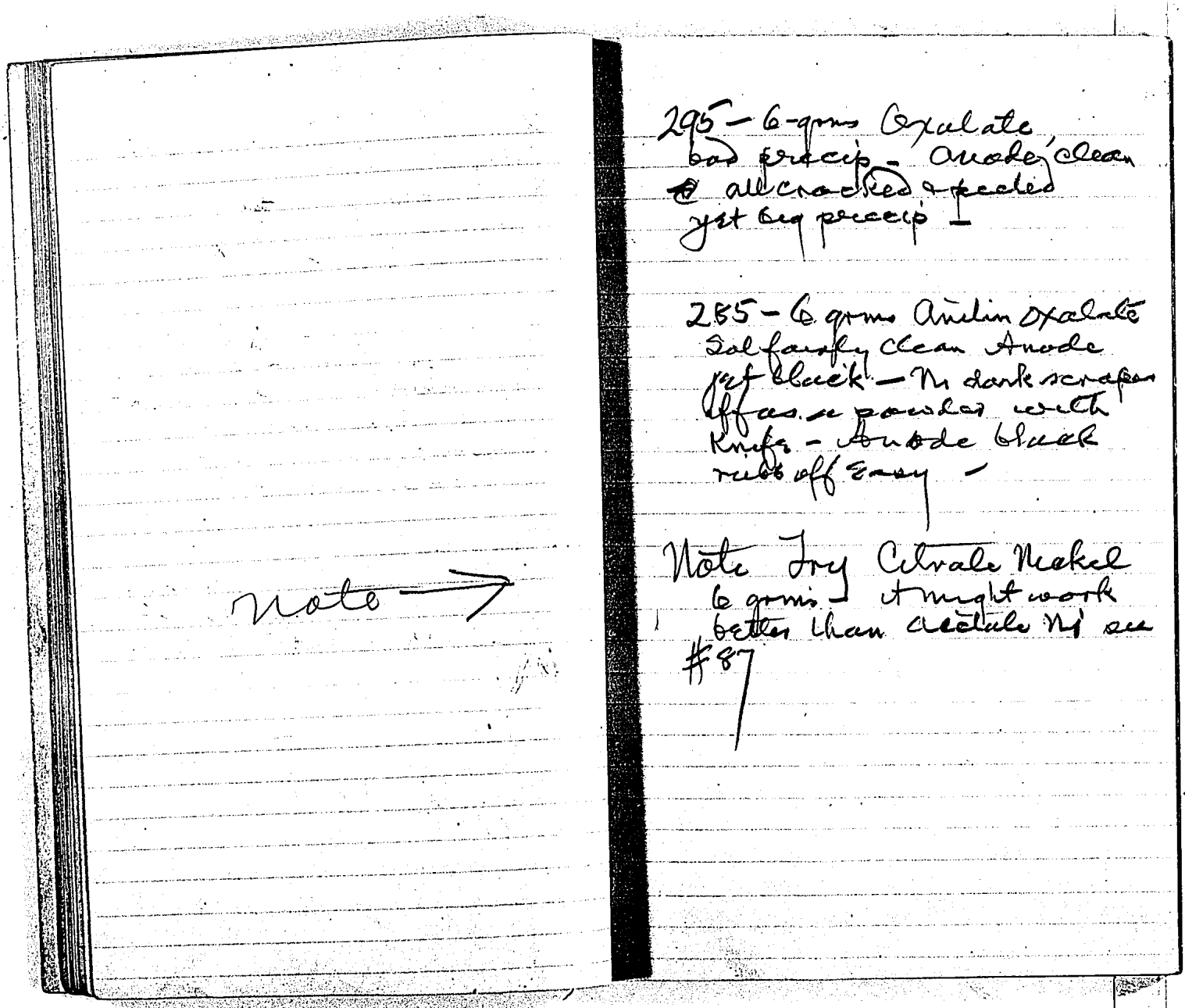
108- 6 gms Sodium alum
Sol very slightly cloudy
Anode clean
Cathode has dark Ni all
Cracked + some hydroxide.

294- 6 gms K Oxalate
ppt on Ni anode clean
Bright ~~except~~ Cracked along Edges

99-5 5 Monochlorohydrin
Anode clean Sol very clear
Ni all Cracked bad

87- 6 gms Ni Acetate.
Anode clean Sol has some
ppt-
Cathode plating Perfect
no Cracking peeling or
turning up at Edges
TOUGH don't break at
right angles - may be the
ppt plated in base at
flat

Note →



295 – 6 grms Oxalate bad precip – Anode clean & all cracked & peeled yet big precip –

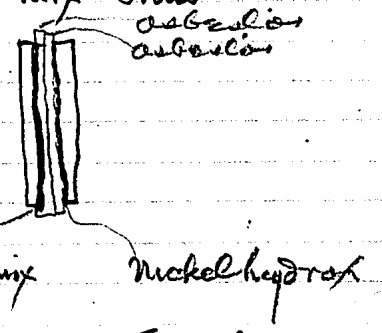
255 – 6 grms Anilin Oxalate Sol fairly clean Anode yet black – No dark scrapes off as a powder with Knife – Anode black rubs off Easy –

Note →

Note Try Citrate Nickel 6 grms – it might work better than oxalate No's see #87

Aug 27 1919

It is likely that plain or perforated sheets say 5 X 6 can be covered with a thin sheet of asbestos over which has been spread a mush of finer than 200 mesh Ni Oxide reg moistened with a little NaOH. The same with 200 mesh iron mix Thus

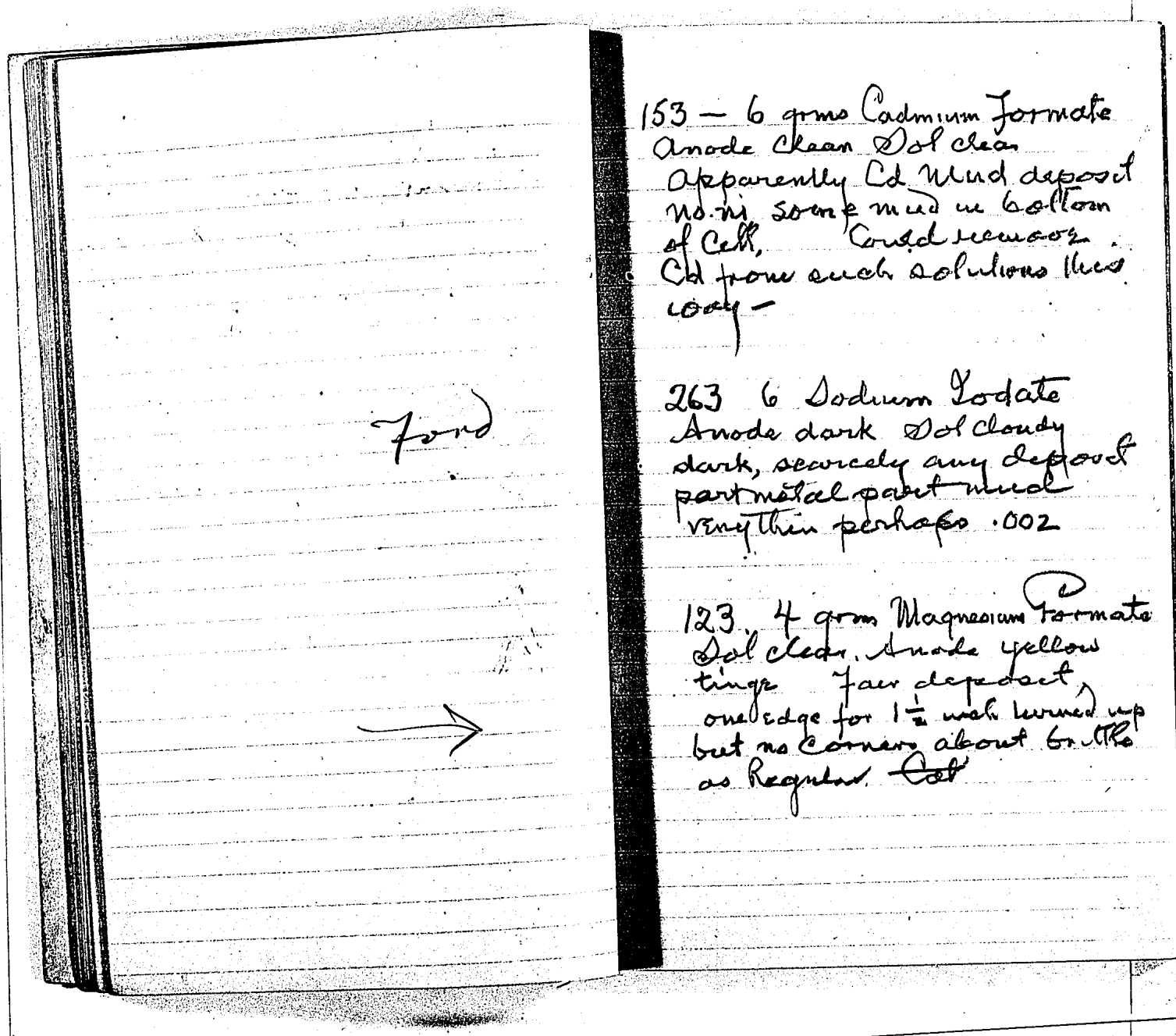


by placing say 15 Ni plates & 16 iron plates together with a thick plate on outer sides & bolted together that a Ford started can be made successful - The heating to be ascertained is the spacing & Stability of the asbestos

Perhaps Japan paper or coarse weave cloth can be dipped in the Varnish we use which is not attacked by alkali - This would act to hold the Fe + Ni mix against the plates + possibly be more stable than Asbestos

Perforated Mica might be used possibly.

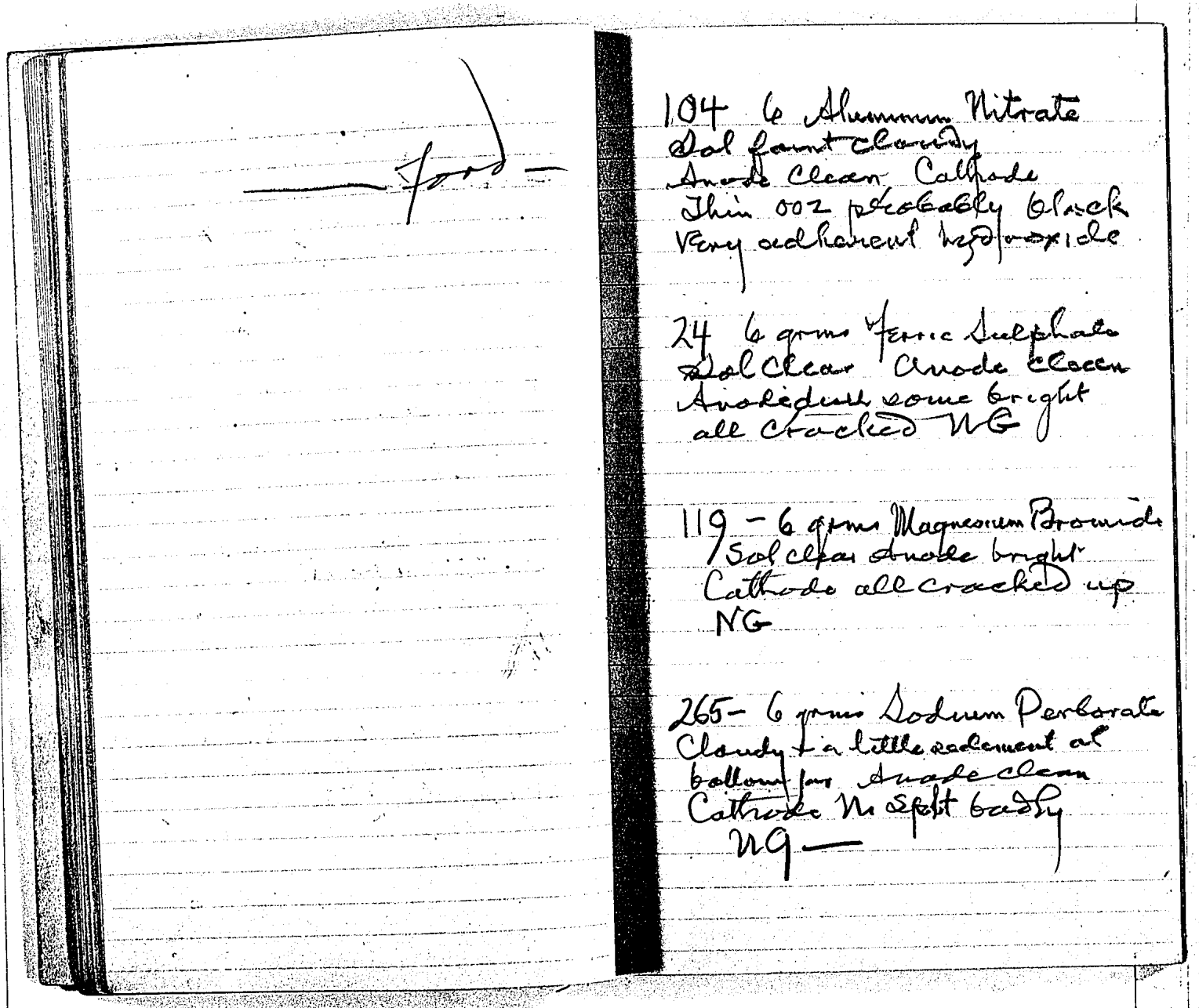
Glass cloth, (Lime glass) could be used



153 — 6 grms Cadmium Formate
Anode Clean Sol clear
Apparently Cd Mud deposit
no Ni, some mud in bottom
of Cell, Could recover
Cd from such solutions Theo
ory —

263 6 Sodium Iodate
Anode dark Sol cloudy
dark, scarcely any deposit
part metal part mud
very thin perhaps .002

123 4 grms Magnesium Formate
Sol clear. Anode yellow
tinge Fair deposit,
one edge for 1 1/2 inch turned up
but no Corners about 6 m.m. thick
as Regular ~~Cat~~

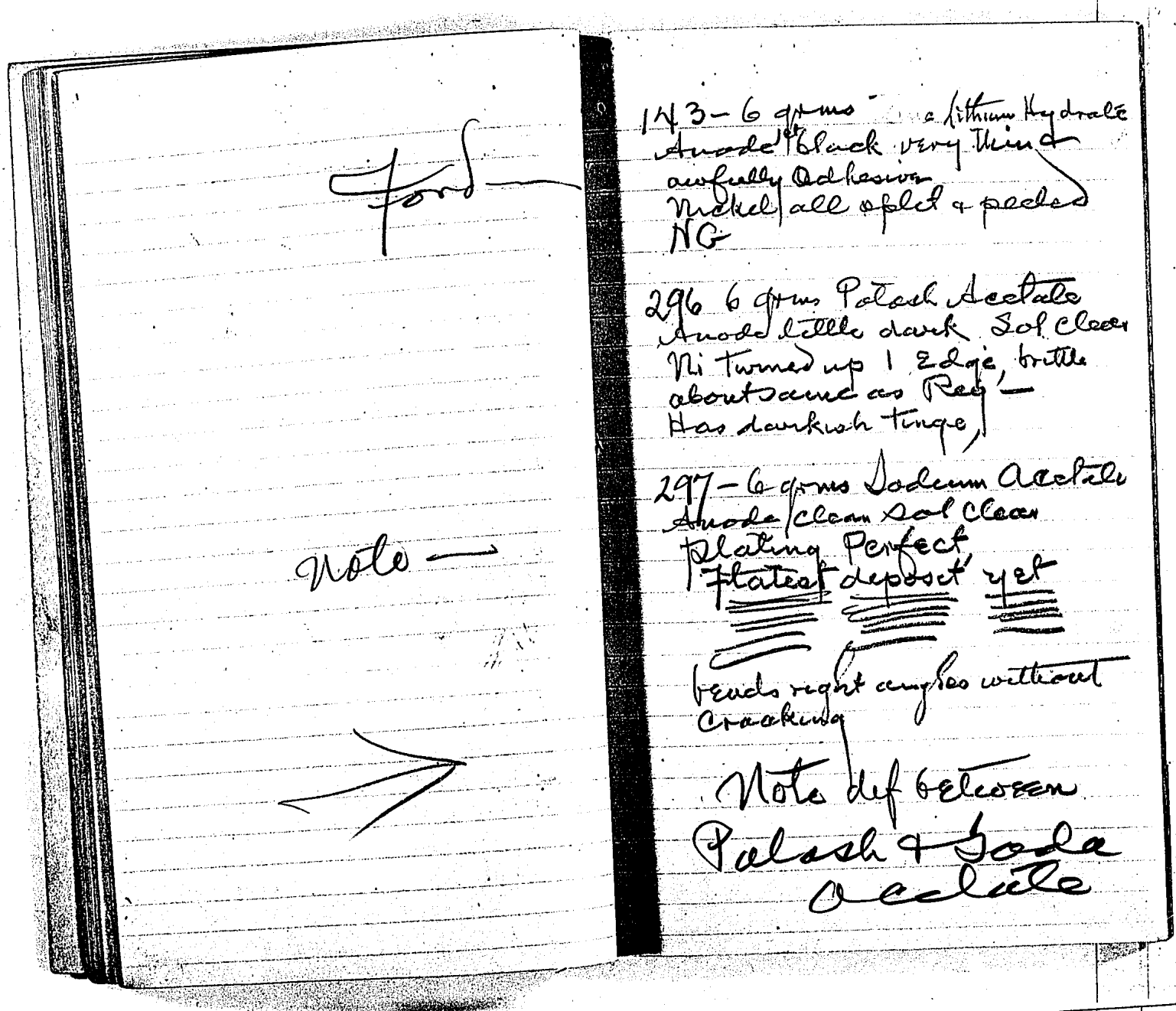


104 6 Aluminum Nitrate
Sol faint cloudy
Anode clean Cathode
Thin 002 probably black
Very adherent hydroxide

24 6 grms Ferric Sulphate
Sol Clear Anode clean
Anode dull some bright
all Cracked NG

119 - 6 grms Magnesium Bromide
Sol clear Anode bright
Cathode all cracked up
NG

265 - 6 grms Sodium Perborate
Cloudy + a little sediment at
bottom jar Anode clean
Cathode No Split badly
NG —



Ford —

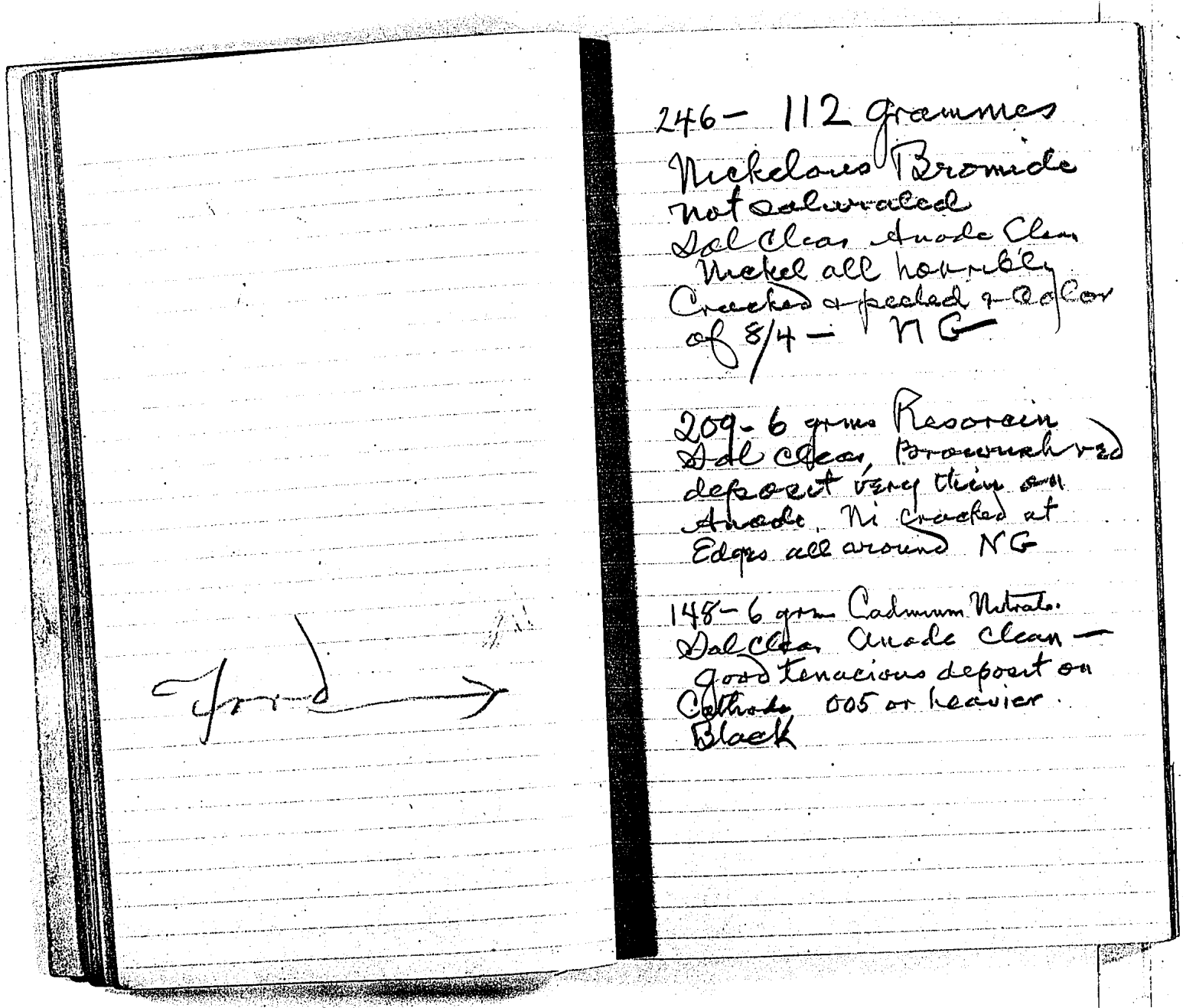
Note —

143 – 6 grms Lithium Hydrate
Anode Black very thin &
awfully Adhesive
Nickel all oxid & peeled
NG

296 6 grms Potash Acetate
Anode little dark Sol Clean
Ni Turned up 1 Edge, brittle
about same as Reg —
Has darkish tinge,

297 – 6 grms Sodium Acetate
Anode clean Sol Clean
Plating Perfect
Flatest deposit yet
bends right angles without
Cracking

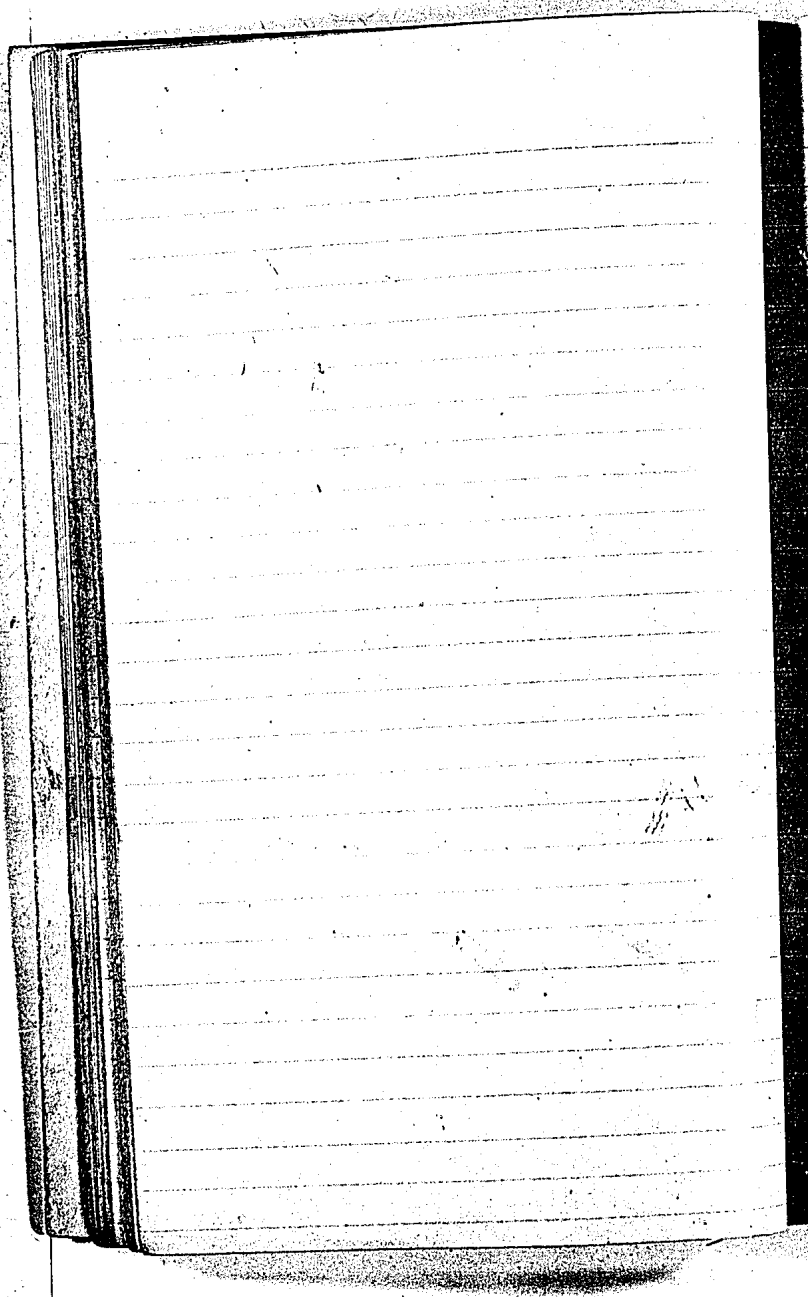
Note diff between
Potash & Soda
Acetate



246- 112 Grammes
Nickelous Bromide
Not saturated
Sol Clear Anode Clean
Nickel all horrible
Cracked & peeled & Color
of 8/4 — NG

209- 6 grms Resorcin
Sol clear, Brownish red
deposit very thin on
Anode. Ni Cracked at
Edges all around NG

148- 6 grms Cadmium Nitrate.
Sol Clear Anode clean —
good tenacious deposit on
Cathode .005 or heavier.
Black



59- 3 grms Cinchonine
Anode clean Sol Clear
No deposit, dark tinge

145- 4 grms Lithium Sulfite
Anode clean Sol Clear
Cracked along Edge,
lifted, White matte
Very Tough bends twice sharp

301- 6 grms Manganese Acetate
Sol cloudy Anode black
deposit jet black
Nickel cracked all along
Edges, brittle as Reg

295- 6 grms Aluminum Acetate
Anode clean Sediment in
Cell a cloudy Nickel
badly Cracked NG

247- Saturated Sol
of Nickel Chloride
Sol Clear Anode tinted
All cracked + peeled has color
of 8/4 NG

12 grms is Great,

302 6 grms Stannous Acetate
Clear Sol Anode Clean
Nickel peeled early - 2
Coats, Brittle Like Rag

248 — Nickel fluoride not
Saturated & had to put
large quantity Ammonium
to Neutralize
Sol Clear Anode black (jet)
Think deposit Nickel —
Ni all peeled, & Cracked
not Brittle,

Dup of 77 - 12 grms Citrate Soda
Sol Clear, OK perfect nearly flat bends
flat at corner no break, Springy, bent 3 times OK
broke 4th
77 — 8 grms - Same as 12 gr
bend sharp at corner twice broke 3rd
flat recount like 12 OK perfect.
77 — 4 grms. broke on 1st bend
flat, springy, OK perfect
77 - 2 grms turned up one edge
Bends OK Twice, Springy, & add allowance
like 12 grm

77— 16 grams clear Sol
One edge turned up
More afterungy than the others
seems to be thicker,
bends 3 times

The range is 4 to 8 grams
probably 6 grams per
250 cc of Ni SO4 nearly
Saturated.
Now the question arises to the
Citrate. Is acid destroyed
or changed, or is solution once
made permanent. Only way
is to keep plating out Ni and
after a while put in a 8/4
test plate

55—Duplicate 2 grms
Ammonium Alum Sol clear
Anode clean — Ni terribly
Cracked NG

Note →

Summary Above

55 Dup 4 grams. Sol clear Anode dark spots. badly Cracked Ni not so bad as 2. gr.

55-Dup 8 grms. Sol clear anode clean badly cracked Nickel

55 Dup 12 grms, anode clean Sol Clear cracked Coulen peeled off - red Color - Very thin plating

55 Dup 16 grms. peeled Ng like 12 gr

55-Dup 2 grms, some metal + some green hydrox

There was some mix up in Original # 55 to have got such good results. What's

~~Back up~~

Dup 248 — 6 grms Nickel Silicofluoride
Anode Clean Dal clear
breaks on 1st sharp bend, has
fine marks on, it scaled up slightly
at 2 corners Not pronounced
but Variations nearly marks of
Ok — I suspect Silicofluoric
acid use got from Cooper is
impure — p66 has Sulphuric
acid in or Copper Etc

Dup 248 — 18 Grams
Silicofluoride Nickel
Anode bright Dal cloudy
Nearly breaks 1st sharp turn
full fine rough spots with
black streaks running up
from them not pronounced

300 - 1½ grams Cobalt
acetate Dal dark
Anode Clean Ni perfect
Sharp bend 6 times
has sharp fine specs on it
not many marks -
Very good

Sulfate aluminum
NG

Dep of #1 4 grams Sulfate of Aluminum — Sal clear
Anode clean
All cracked up - NG

Dep 248 — 36 grams Silicofluoride Ni
Sal clear Anode clean
Ni Turned up very slight cut
1 corner broke 2nd sharp turn
full black sharp plate

131 — 6 grams Manganese formate
Sal clear Anode clean
Curled up, split, broke
1st sharp turn.

Dep 8 grams Sulfate Aluminum
Anode clean Sal cloudy
Ni cracked NG

Ford-Kolo-

Possibly with N_2SO_4 sol + 6 $NaNO_3$ I could saturate this sol with Either Salvadson by $NaNO_3$ or some other sol salt, make it Cathode, after covering reverse from sol dry cloudy + after say 10 hours + 220 temp percolate out the salts + Thus make $Mn(OH)_2$ hard + Very porous, too dense now

Possibly I can use spongy Ni by H + make it Anode in a sulfate sol Containing ~~H, Cl~~ + mechanically Reverse + precip the $MnSO_4$ in situ + do this till only net work a nuetral sponge left to conduct.

Possibly Ferric or ous Sulfate will do this / deposits with $NaOH$ after drying Fe_2O_3 be precip with the $Mn(OH)_2$ locking it together like - opal tube,

for Cu Expts up to now

$NiSO_4$ - 4 grms Tartrate Paste sol Clear Anode clean peeled anode, brittle -

$MnSO_4$ — 2 gram Tartrate K sol Clear Cathode Clean one Edge turned up — Clear, broke 2nd bend

Dup-#6 — 8 grms Manganic Sulfate Anode on placed dark — Whole top loose — broke one bend —

Dup 6 — 4 grms $MnSO_4$ Anode + sol Clear one Corner turned up broke 1st bend -

Dup 6 - 2 grms $MnSO_4$ ic Anode sol clear one corner just kefled broke 2nd bend

Manganese Sulfate

mg

K Jodrate

mg

Dup of #6 - 16 grms $MnSO_4$ in dark brown color slightly cloudy

No peeled + Cracked along Edges ng

ditto 12 grms no Cracked + peeled watch so Good as 16 grms

Dup 272 - 2 grms Citrate Potash Sol + and a Clear one Edge turned up broke 1st Sharp Edged

Dup 303 - 8 grms K Jodrate both Clear No gel Cracked + peeled

ditto 6 grms all peeled + Cracked

ditto 12 grms all peeled + Cracked

Ford

Note. If I make a nearly saturated Sol of $Ni.NO_3$ it deposits a dark hydrate of Ni very very slowly If I use a 2% Solution it deposits quickly a fine transparent green & very quickly. Strong Sols of Nitrate are thus found bad while weak ones are good

I notice that with weak $NiNO_3$ Ni Cathode dipped in Nitric to clean & then washed that the green sticks tenaciously to smooth part above the bags but flakes away at holes Perhaps 005 plates many & thin coat put on very slowly say 20 Mil amp per 1^{in} both sides will serve if made Matte by acid dips —

If Cauget run this way all that would be necessary is sheet paper or asbestos between Each Fe & Ni plate. The several plates Clamped together by 2 heavy outside plates —

Dup of 118 2 grms Magnesia Acetate - Anode darkish Sal Clean Plating Perfect Curled a little make 1 bend OK, broke a little on 2nd bend - OK Matte

Dup 272 Anode + Sal Clean 4 grms Potash Citrate one Edge lifted, Curled up to roll broke 2nd bend

Dup 118 6 grms Magnesia Acetate Anode slightly darker - Sal Clean 1 corner lifted very slightly broke 2nd bend

Dup 118 - 8 grms Magnesia Acetate Anode darkish Sal Clean Plating Perfect Matte Lamp Nearly flat broke 3rd bend OK

Dup 272. 8 grms Potash
acetate, Anode clean
Sol cloudy
Ni peeled—

Dup 118— 16 grms Magnesium Acetate
Anode dark in spots
Ni plating OK— sharp corners
on it broke 3rd bend—

Dup 78— 2 grms Sodium Tartrate
Sol clear Anode clean
Ni Plating Perfect broke
3rd Bend dont Cont float
Metals—

Dup 78— 8 grms Na Tartrate
Anode Sol clear 1 corner
turned up. broke 2nd Bend

Dep 118 12 grms Mg Acetate
Anode black Sol clear
Plating perfect
Clings very light to Cathode
Sparingy broke 2nd

Dep 78 ~~Sod~~ 4 grms
Sodium Tartrate,
Anode + Sol clear
One Corner turned up
broke 1st & 2nd only Cracks
a little

Dep 78 – 16 grms Sodium Tartrate
Anode + Sol clear
Plating Perfect broke
first & 2nd cracks only
slightly – Thumb piece
was slightly raised Matte

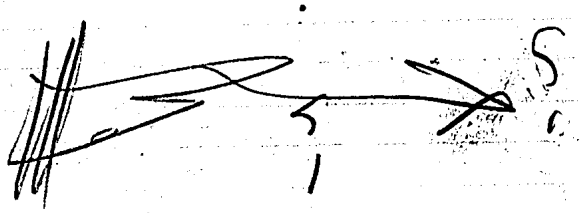
Dep 76 – 12 grms Na Tartrate
Anode + sol clear
plating perfect
Very slight cloud at one corner
middle cloudy little & sparingly
broke 2nd & a little on
1st.

181 6 gr Santonin, Anode & sol
clear. Corner up, broke 1st & end
not sparingly middle

233. 6 grms Hyposulphite Soda
Anode covered with some kind
of Crystals. Plating perfect
broke 1st turned flat spots on it
Sol has precip – too much
of the Hyposulphite. Test with loss

184. 6 gr Sodium Succinate
Sol Clear Anode clear
Bath – peeled Evenly

227 – 6 Beta Naphtol Anode
Clear Sol Cloudy + precip
Mc all Cracked



49 – 6 grms Benzidine Sulfate
Sol clear Anode clear
The Worst Cracked Coating
Yet –

10 Dup 2 grms Boric acid
Anode & Sol clear
found it peeled full length
about 50 Min – Makes
3 Bends before Brkg – Curled
up nearly Cramped Matte

180 – 6 grms Salol Anode
Sol clear Ni plating
perfect Bends 6 Times
before Cracking – Comes off
nearly flat. Matte

187 – 6 grms Sulphonal
Anode & Sol Clear
Plating perfect
Bends Break 7th
Matte & slightly dark

I note that when an edge is turned up or whole film peels it is always at the TOP (not always) Will not have this to contend with in plating discs —

204 — pyrogallic acid Sol dead black anode black. all Cracked Ng

214 6 gram Sodium Alcoholate Readily fundissolved at 70°, but Sol clear amber dark spot Edge turned up — broke 2nd bend —

See 5 pages further on

Irq Butyric acid Soda Salt
Ni Salt. Mg Salt.
also Aconitic + Itaconic
acid Na Salts.
Acetamide Acetanilide
Acetone. / Methacetin /

Sept 2 1919

Note de lande CuO plates
Exp nts

To diminish shrinkage of present plate, without changing process powder too much fine, firebrick —

#1	add 5%
2	7
3	10
4	15
5	20%

Bake these regular way they do not moisten with ~~potash~~ soda as usual.

If plates are baked req, They can be repowdered made over + these will not shrink

If the Metal Copper ~~pa~~ turned into CuO + baked higher + longer like plates then when made into plates will probably not shrink If this powder has been up to plate baking

Irelands — CuSO4 10%
best under 4 ett at
1300 @ 1350 less blue
Comes out
1300 @ 1350 — +ESO4 next

temperature its probable that
no BLUE will come out in
NaOH
Experiment — Powder up
Reg baked plates Crush
thenfe 180 mesh & Try Sulphuric
Lime glass Etc +ESO4 dry etc + see if Blue
Comes out

Expmt Put some of powder
Read from Silver X with
which we have been using
put in NaOH & see if Blue
Comes out, —

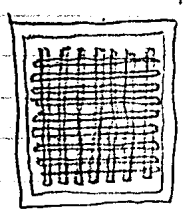
Try look together ~~off~~ new reg
plates repowdered with
Sulphate of Copper Iron
Lime Barium Strontia
Etc — + Alumina, SO_3 will
decomp + leave the oxides

If the CuO can be heat high temp
so it gives no blue like a
Reg plate, it also will
be OK is often several Days
warm in NaOH to strong Enough

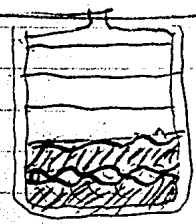
The main thing seems to be to stop the Blue in the NaOH. High temp does it in plate. Can it be made so before it goes into plate by long baking + higher temp like the plate,

Try Infusorial Earth Fuller Earth Electro Silicon — Kieselguhr. This will form Cuboidals,

How about Corrugating Rag plate



has anybody patented this — or Holes in plate



Several plates — Eplet

Acetate Mg.
16 grms too much
12 grms perfect.
Range between 12 grms.
to 16 for 2 hours
probably 5 W O K

probably best

Continued from 3 omitted pages back

Dup 77 Same liquid
6 grms Citrate Sodium PERFECT
bends twice 2 Hours plating
made.

118-16 grms Magnesia Acetate
one edge turned up but near end
of run broke 3rd. 2 Hours plating
Matte

118- 2 grms Dup 2 Hours
plating Magnesia Acetate
Plated PERFECT.
flat, bent 8 times matte

77 Dup 8 grms Citrate Soda
2 Hours plating, bends
5 times, Matte PERFECT

118- Dup 4 grms Acetate
Magnesia PERFECT
broke 10 times, Matte 2 Hours

Callipering as measured possible
Error of Callipers .500 based pm

118 = 2 grms 1.600 smooth part
2.300 Record

4 grms 1.800 Smoothly
2.100 Record

6 grms 1.900 Smoothly
2.000 Record

12 grms 1.900 Smoothly
2.000 Record

16 grms 1.900 Smoothly
2.300 Record

100 ma per inch gives .900 thickness of Mi with Acetate Magnesia

118 Dup 12 grms Acetate Magnesia broke 4th bend Mette,

Lelande —

Broke off piece of ~~glass~~ plate. ready for sharpening from Lecho, in 15 hours in tumbler on wood over hot plate I found the Mg(OH)2 Light Blue Showing it Comes out.

Now 10.20 am - 3rd Sept. Light blue Evidently all over Cells gives blue wheat Eats up Zinc SL Reg Very Little Compared to our Silicates, S + other Experts —

Dup 77 – 2 grms Citrate Soda
Sol'd anode clean
3 HOURS – Perfect flat,
bright matte, broke 5th load –

Dup 118 – 6 grms Acetate Nickel
Anode clean slight Sediment
Gallons Jar – Perfect ——
flat, dull matte broke 4th
load 3 HOURS.

Dup 77 – 12 grms Citrate Soda
Anode darkish Sol clear
Ni Cracked at Bottom
peeled up 3 HOURS

Dup 118 – 8 grms Acetate Nickel
Anode Sol clear
Ni PERfect 3 HOURS –
Light matte broke 7th load
There was lots of froth on
this Cell for some reason
None on others –

Dup 77 16 grm. Citrate Soda
Anode of Sol Clean
3 HOURS. Nearly float
bright matte, broke 5th.
More springy than less
Citrate.

Dup 77 4 grms. Citrate Soda
Anode of Sol Oak
3 hours — Perfect
shiny dull matte
broke 8th Good —

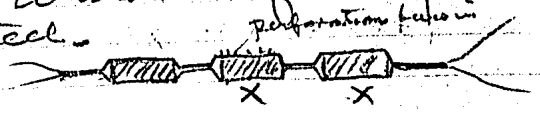
I notice all the Group of
Acetates of Nickel are
frothing on top from gas
My theory that according to
Catalytic action of the Ni
Metal the Acetic Takes on
hydrogen in its molecule
& thus prevents the Nickel
from absorbing it is the
reason why the Ni is not
brittle & tends to curl.

The Chemical the result of Acetic acid taking on H O may be a soap like chemical which account for the froth. The frothing did not appear on Acetates of Magnesium group except one Cerf. The Citrates act the same way absorbing Hydrogen Its probable all of the Acetic series Except Formic will act as absorbers of Hydrogen

Perhaps Can use an Electrolyte like Nickel, + add Acetate of Mg or an Oleate to dissolve the liquid + transform the Oleate to Stearic Etc — This would be a new Comel process for raising the Fatty Acids higher by Means of Electrolysis

2nd Sept 1919

Ford – Proposition now is to perforate in strips 3/8 wide. The whole sheet of .005 Ni plated steel.



5" wide 6" deep

Mix the Ni(OH)2 with small amount of NaOH & squirt it in ribbons by a die & hydraulic press. Cut in proper lengths & dry – Have one hand complete one plate only. The other plate is put on & run in hydraulic press. The two are heat together & while in position the 2 plates are riveted or secured or heat welded together along the non perforated parts between the perfd plates.

possibly has to be better

The Coronation pocket being all in one sheet it is likely burrs can be ground down considerably to give better density rods, without danger

Commercial for factory Mfg Copper Ni Zn Silver Gold & other plating Metals in sheets from Copper Cathodes .001 up to .010 –

New Plating Salts Hydrogen absorber like Acetates, Citrate Etc for Nickel Plating: malleable non brittle & springy.

& for stripping plated Metals from Anodes,

Forming Hydroxides by fusing Nitrate of the metal wanted & forming Hydroxide on Cathodes. Separating off Condensed by Water power,

All Acetates Nickel
N.504 froth at
top of Sol

Dup 87 – 12 grms Nickel Acetate
Anode tinted Radish. Frothy top
Liquid Clear Plating Perfect
flat, Matte but not white
broke 3rd Bend 4 HOURS
PERFECT

Dup 87 – 16 grms Nickel Acetate
Anode slight Bronze Sol clear
frothy top – Ni Perfect – 4 HOURS
flat. matte, dull. broke 3rd Bend
PERFECT

Dup 87 6 grms Acetate Nickel
Anode + Sol Clear. frothy top
flat, Matte dull – broke 4th Bend
4 HOURS PERFECT

Dup 87 8 grms Nickel Acetate
frothy top + Anode + Sol OK
flat, dull Matte. broke 10th turn
4 HOURS PERFECT

Dup 87 – 2 grms Nickel Acetate
Anode Sol OK – 4 HOURS
Comes off Dead flat broke
8th Bend Perfect 10 turns broke
Dull Matte.

Think 4 to 6 gms Gelat
Thio has enormous range
but do not like the
froth Bad Anode Efficiency
Equals, perhaps McAdals
better, it has no froth &
was nearly Neutral
when 2 Cathodes Green
plated out -

2.29 gms

Dup 87 - 4 gms Nickel Acetate
Quadetinted Lighted 4 Hours
Dead flat PERFECT
dull matte - Broke 10th bend

Spun all of the Dups of
87 - quite acid Thio can
not be used with Acetate of
Magnesia

87 - Acetate Ni Going over
I tried make it neutral by
adding $Ni(OH)_2$ it seems to
have no effect although
8 gms has been on left
after Steam Company off
for last 3/4 hour

No 1 - Dup 12 grams Dull Shade
Alumina - 2 Hours 29
Nickel Anode & Sal Clear
All cracked & Peeled

Dup of 10 – Shade blood red rubber off – Sol Clear
Nickel bad at bottom
Dropped at 12p NG –
4 grms Boric acid
on 2 hours 25 minutes –

Dup 10 – 16 grms Boric acid
shade brownish Sol Clear
M Stripped, but good –
Bright, Curled up, broke
2nd bend seems thick
on 2 Hours 25 min – at
room and more than
2½ hours –

Dup 1 Sulfate, shine –
16 grms NG

Dup 10 2 grms Boric Acid
Rubber black, Sol clear
Cracked all along all
Edges NG 2 Hours
25 min –

The CuO Lelande disc
8% of S Lake dried sulphate
baked 1250° 4 hrs & soaked in
water, (Thus stood 20 1 ft drops
& 1 3 ft drop) then put in
NaOH for a week then Emptied
& put in fresh NaOH 20%
showed same
blueing Titan Req 52 plates
blueing after 15 hours.
28 Hours Req 15 hours
iron plate about equal
blueing.

Iron will do the Biz
I think

Temp of Solutions is
134° F 4 hrs

Dup 10 — 8 grms Boric acid
Solution very acute clear
Ni Perfect 2 Hours 25 Min
broke 4th Band — Not much
Matte —

Things to be tried on plating
Nickel Bz

6= Acetate Ammonia
" Anilin
" Of all the Organic bases in dumpy
like Diphenylamin, Monophenol,
Paraphenylenediamine
Acetate Quinine
Try the two Ketones brought by Simpson
A. Chinese,
Acetylene gas
Acetate
Propionate of Magnesium
" Soda
" Nickel
Butyrate of Magnesium
" Soda
" Nickel

Each of the chemicals in the dummy bottles in Show Case

Trichloroacetate of Magnesia
" Soda
" Nickel

Acetanilid -
Acetamide
Anisadin
Acetone
Aconitic acid Mg Salt
" Ni "
Na "
Adipic acid Mg Ni + Na Salt
Benzoic " Mg Ni + Na Salt
Amidobenzoic acid " "
Arachidic acid " "
Caproic " " "
Caprylic " " "
Carbolic " " "
Fumaric " " "
Glyceric " " "
Glycolic " " "
Hippuric " " "
Lactic " " "
Maconic " " "
Levulenic " " "

Malic acid / Na Mg Ni Salts
Monobromoacetic " " "
Monochloroacetic acid " " "
phenylacetic " " "
Phthalic " " "
Quinic " " "
Salicylous " " "
Terephthalic " " "
Ortho-Toluic " " "
Para " " "
Meta " " "
Tropic acid " " "
Valerianic acid " " "
Sodium Methylate ~~" " "~~

Note, ~~III~~ I put a Zinc in 20% sol. + then added 30 to 40 grams Acetate soda, used a Nickel Strip, This gives with 50 Ma a Voltage of ~~3~~ 3 tenths of a Volt for 10 hours + then diminished after Going on all night + 12 hours it was .29 Volt or 38 Ma — The idea is that the Hydrogen is taken care of by absorption of H by the Acetic Anhydride Salt clear

Note = for separators in Storage battery - Iron wire dipped in Melted wax of Paraffin and Vaseline solution, also some filled with short fibre Cotton, also, Cotton - Limestone powder or $BaSO_4$ - or without Cotton but just Cinnamon - Limestone,
Were shorted by peroxidized on surface a coat up to Red - Possibly just wire alone Could be used being sulphurized but then coat up to dull yellow in air to coat with layer of Fe_2O_3 anhyd

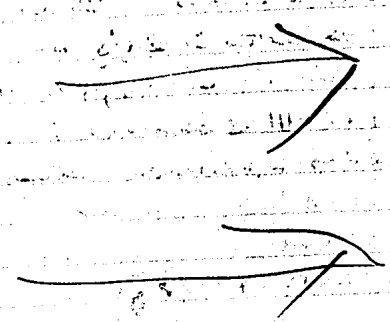
If a very sensitive acetate or Citric compound is used + a large surface of Spongy Nickel the Voltage by Calculation of the acid melt absorbs H strongly + gives very much higher Voltage, possibly it could reach or Exceed Copper Ox. Voltage + be substituted for CuO in Leclanche battery -

~~2~~ 100 ma per inch

45 = 6 grms Paraphenylenediamine Sulfate Boil dark not clear Add lead Acetate Positively the worst yet, Cracks fee over into 010 leaflets Might be possible to make Ni flakelets way — J. Hovey in

185 – 4½ grms Sodium
Sulphoantimonic –
Sol dark Orange clear
1 Hour – Cracked all
along Edge – Thin

193 – 4½ grms Sodium
Trichloroacetate. Sol
Clear Orange Of
Can't get it off – quite thin –
Sticks absolutely –
Very bright slightly Matte –
Its quite sticking & would
be useful where sticking
to the other metal is
desirable
The grain of the Ni is
Excessively fine –



Note – J.W. Miller made some Mixed oxides of Fe + Mg by igniting $FeSO_4$ + $MgSO_4$ 75 $FeSO_4$ + 25 $MgSO_4$ 5 grms reduced by H gave 1200 M.A. Hours

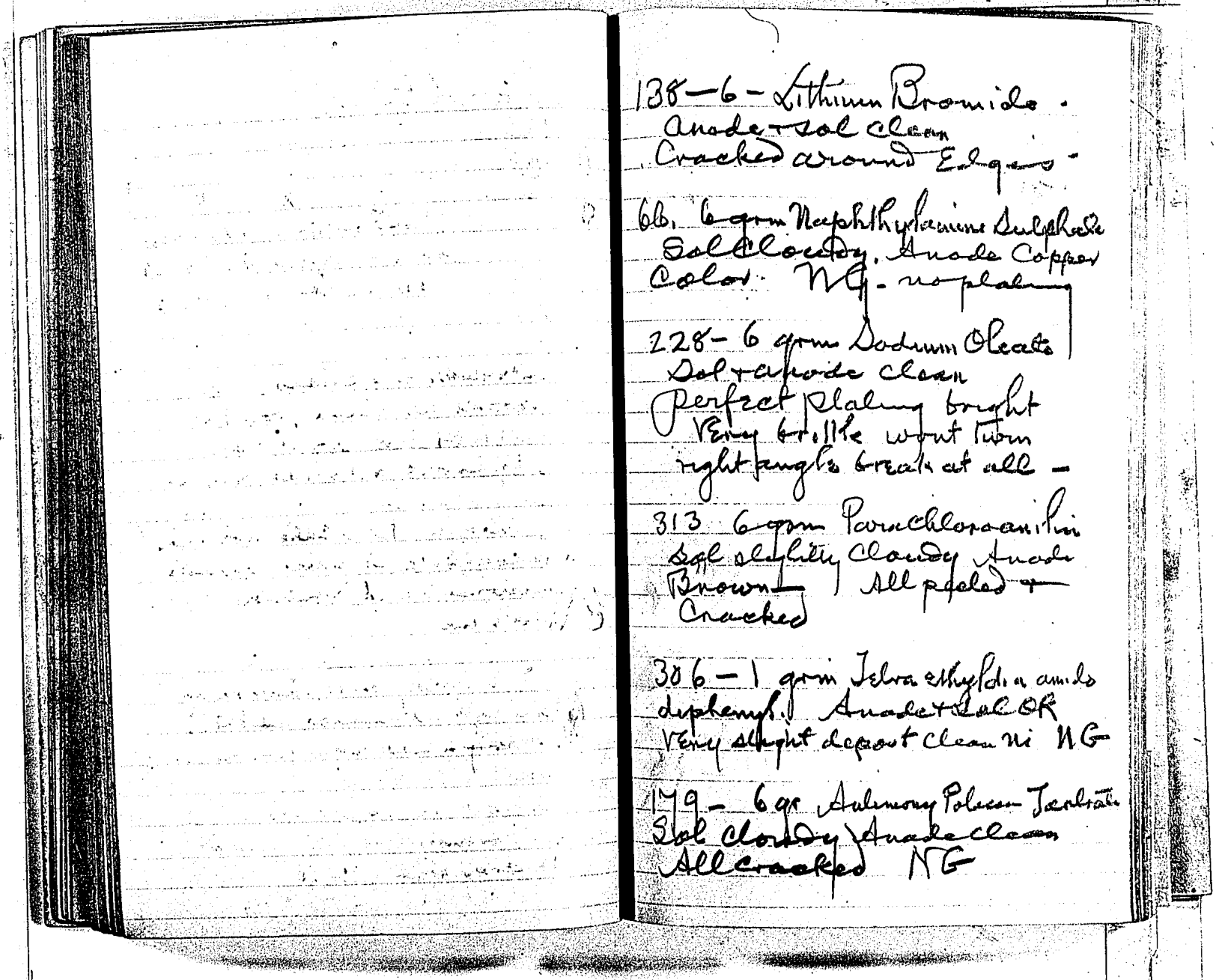
I now am trying to dissolve out the MgO by Weak Sulfuric to make the Fe_2O_3 More porous to last in Cell —

M 10 min. Sat grees $Mg(OH)_2$ by Current is scarcely Fe —

217 6 grms Sodium Maleate 1 Hour Sat + Anode OK Matte dark ish Perfect flaking But after stripping off Heat the slightest bend it breaks to as brittle as glass —. I crumpled it in fingers to flake – but is good, Thick might be useful Phenomenon ! !

215 – 6 grms Sodium Linoleate Sat clear Anode red ish Badly Cracked + peeled NG

155 6 gr Cadmium Sulphate Sat Clear Anode Copper Color Cadmium Sponge on Cathode NG



138—6 - Lithium Bromide.
Anode sol clear
Cracked around Edges -

6b. 6 grm Naphthylamine Sulphate
Sol Cloudy. Anode Copper
Color NG - no plating

228 - 6 grm Sodium Oleate
Sol transparent clear
Perfect plating bright
Very brittle won't turn
right angles break at all -

313 6 grm Parachloraniline
Sol slightly cloudy Anode
Brown All plated
Cracked

306 — 1 grm Tetra ethyl di amido
diphenyl. Anode sol OK
Very slight deposit clear Ni NG

179 - 6 gr Antimony Potassium Tartrate
Sol cloudy Anode clear
All cracked NG

Notes

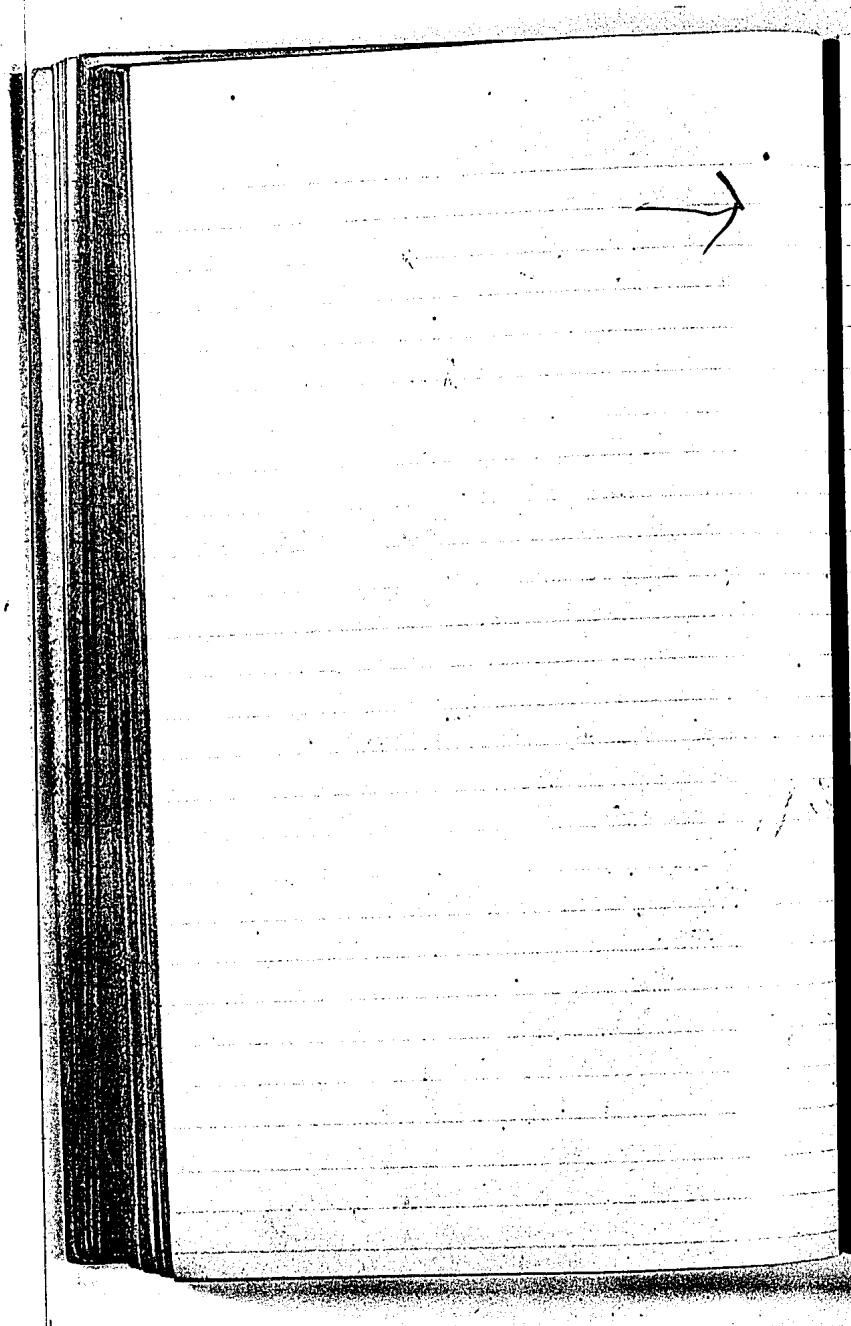
Acetate Mg Cone
is slightly alkaline
to Litmus Red paper

$NiSO_4$ 6 acetate of Nickel
Cannot be made Neutral
Cold with dried $Ni(OH)_2$
from battery Co Even if
fine Thru 180 mesh &
stirred when at ordinary
temperature but if reacted
precipitated $NiOH$ Boiled for
1/2 hour to bleached pale
of Colloid it becomes
Neutral in a few minutes
Cold when Vigorously
stirred Boiled form
will have to be used
A little heat in bath
probably be good
say 120° F the deposit
would go quick

85 – 6 grms Hydroxylamin-
Sulphate Anode clean
Sol Cloudy Cracked awful
NG

299 – 2 grms Cerium Acetate
Sol Cloudy Anode Clean
PERfect gray Matte
broke 4th turn two top
Corners very slight recess –
Comes off flat broke 4th

311 – Cantaz of ? ? 6 grms
Anode Sol Clean – Perfect
except two top Edges very slightly
turned up – broke 4th End
turns 1/2 Corkscrew shape
on pealing off –



Dup 187 – 8 grms Sulphonal
Sol hps precip – Anode ok
Edges a little cracked beat
pretty good plating – breaks 5th Gem
White matte,

Dup 187 – 4 grm. Sulphonal
no sediment Sol cloudy
Edges turned up top + bottom
Pen bright matte, broke 4th
Gem — Edges slightly cracked

Dup 187 – 2 grms Sulfonal
Anode clear Sol Kl cloudy
Broke 8th Gem ragged Edges,
top + bottom Corners turned up.

Dup 180 – 8 grm. Dalof. 7 Hours
Sol + anode Clear broke 6th
One Edge corner slightly turned
up — Pretty good plating
Lead colored matte,

Dup 180 - 4 grms Dalap
Sol + Anode Clear 3 Hours
One top 1 bottom 2 edges
turned up 2 edges little fuzzy
Cracked in spots, fair plating

Dup 180 2 grms Dalap 3 Hours
Sol + Anode ok
one edge slightly turned up
This is good plating
broke 5th bend

3 Hours
Dup - 136 - 16 grms Lithia Citrate
Anode very clear little Sol
broke 13th bend - light matte
Plated perfect flat 3 Hours
Dup 274 - 2 grms Citrate Magnesium
Sol + Anode ok bright broke 15th bend
Plated perfect flat
Dup 136 8 grms Lithia Citrate -
3 Hours - plated perfect -
15 bends flat

All platings is 100 Mil per inch

136 Dup. Anode 10R —
2 gms Lithia Citrate
Plating perfect, head Color
Light shade — 13 turns bent,
flat, 3 Hours

Dup 136 - 12 gms Lithia Citrate.
Sol Anode 10R broke 10th
Perfect plating 3 Hours
20 Mil Perfect plating

Dup 136 — 4 gms Lithia Citrate
broke 20th turn — brighter middle
3 Hours plating Perfect plating

#33 1 Hour

1 Hour — .75 grm Nickel Ammonium Sulfate in 200 cc water, Neutralized by NH4OH, some sediment and a clear only a blush of bluish Ni - NG -

1 Hour

312 - 6 grm Fluorene, Organic filtered, anode Gal Clear one corner turned up brilliant Red

1 Hour

238 6 grm Sodium Phthalate big froth on top. Gal Clear shade turned brown heavily a blush of Nickel

1 Hour

31 — 50 grms Ammonia Chloride in 250 cc H_2O + 10 grm of Ni Borate just saturated Clear Gal anode OK pealed + Cracked

1 Hour

305 1 grm Dimethylamino-azobenzene - filtered. Anode Gal OK .5 to brown bright matte - One corner turned up

Note, last lot seem have Cu in H2SO4 —

307 — 16 grm Phenanthrene
filtered Anode sol clear
all peeled.

Sept 5 1914

126 — 1 Hour - 6 gr Manganous Bromide
Anode + Sol Clear
plated OK — sharp pieces on
broke 4th Hour.

310 — 4 gr Paradichlorobenzol
Anode Sol OK
One corner turned up, sharp
specs on surface has Copper
Color tint,

314 — 2 grm Hydrazobenzol.
Anode sol OK all Scaly peeled
bottle —

304 — 6 grm Alphanonitronaphthalene
peeled off bottom + one top NG

Citrates are nowhere near as good as Acetate Magnesia —

188 – 6 grms Sodium Tannate
All black Mixed up
Anode OK Nickel Cracked
thin – in scraping Ni it
breaks up just like flakes –

176 – 60 grms Ammonium Formate
Anode OK Solution
All Cracked & peeled

Dups

Dup 276 – 3 Hours – 2 grms Ni Citrate
Sol & Anode Clean, bath top
Corners basic – Lead but matte
Broke 6th Grms. 3 Hours

Dup 276 – 8 grms Ni Citrate RT 5.1 OK
Plating OK Broke 4th 3 Hours

Dup 276 – 4 gr Ni Citrate 3 Hours
Old but peeled Ends,

Dup 276 – 12 grms Ni Citrate 3 Hours
Plated OK but full specs
rough –

Dup 276 – 16 gr Ni Citrate 3 Hours
One corner deposit Cathode and bubbles
Broke 4

NOTE

Dry Strong Acetate Nickel + Acetate Mg 6 grms - alone no Ng Say

1 Hour -

317 6 grms Dinitrodichlorobenzol Sol + Anode ok all Cracked bad. NG

309 - 6 grms Trichlorophenol Anode Sol ok Edges slightly Crack + turned up one side -

324. 6 grms Dioxy Naphthalene Sol + Anode ok Nearly ok plate but Center near Tap all Cracked

308 - 6 grms Paranitroaniline Anode Sol ok, brittle Tap cracked Tap peeled + Clear edges Rest ok - 1 Hour -

332 6 grms Pyrocatechin 1 Hour
Sol dark Anode black
don't rub off Deposit Ck'd
some peel dark streaks -

316 - 6 gr Ortho. Toluol 1 Hour
Sulphonamide - Anode Sol dk
Cracked at Edges, dots streaks
therefrom broke 1st Grad -
not permanent

318 - 6 grm Thiosinamine 1 Hour
Anode clear Sol slightly
Cloudy Cathode quite thick
black deposit fully 1 oz thick
Very adherent.

319 = 6 grms Orthonitroparatoluol
Anode dark - epoly Sol clear
all cracked peeled NG 1 Hour

330 - 6 grm Metaphenylenediamine
Basic 1 Hour - Anode brown
Very thin deposit Ni Edges all black
NG

315 4 grms Anthracene Sol
Clear Anode slight dark
in spots. Brake 5th - one
2 edge turned up — 1 Hour

323 6 grms Acetanilide.
Anode Sol clear 1 Hour
one edge turned up - broke 4th

320 - 1½ grms Paramidophenol.
Sol dark Anode OK
Erythrin ni scraped off to powder
NG - has slight black under
like 330 - 1 Hour

327 - 6 grm Beta Naphthylamine -
Sol + a/ clear all Cracked

329 - 6 grms Toluidin Grms
Meth - Sol clear Anode OK
Stripped Twice Completely

328 - 6 grms Benzidine
Sol + a/ clear all Cracked
NG

Note Velande,

Using 6% Roasted $FeSO_4$ but not entirely dehydrated the from dehydrating cylinder at H S Lake — Readsdale Iron 180 mesh strength with CuO 180 " 4 pressed on small disc baked 1250° 7 hrs

When put in Water 95 grams the Solution, Colby probably not kept long enough at 1250° perhaps SO_3 from Fe_2 attacks Cu+ leaves $CuSO_4$

338. 6 grams Sodium Mimic some froth — Sol & cloudy Anode clean lifted 4 Corners broke 1st band Very bright —

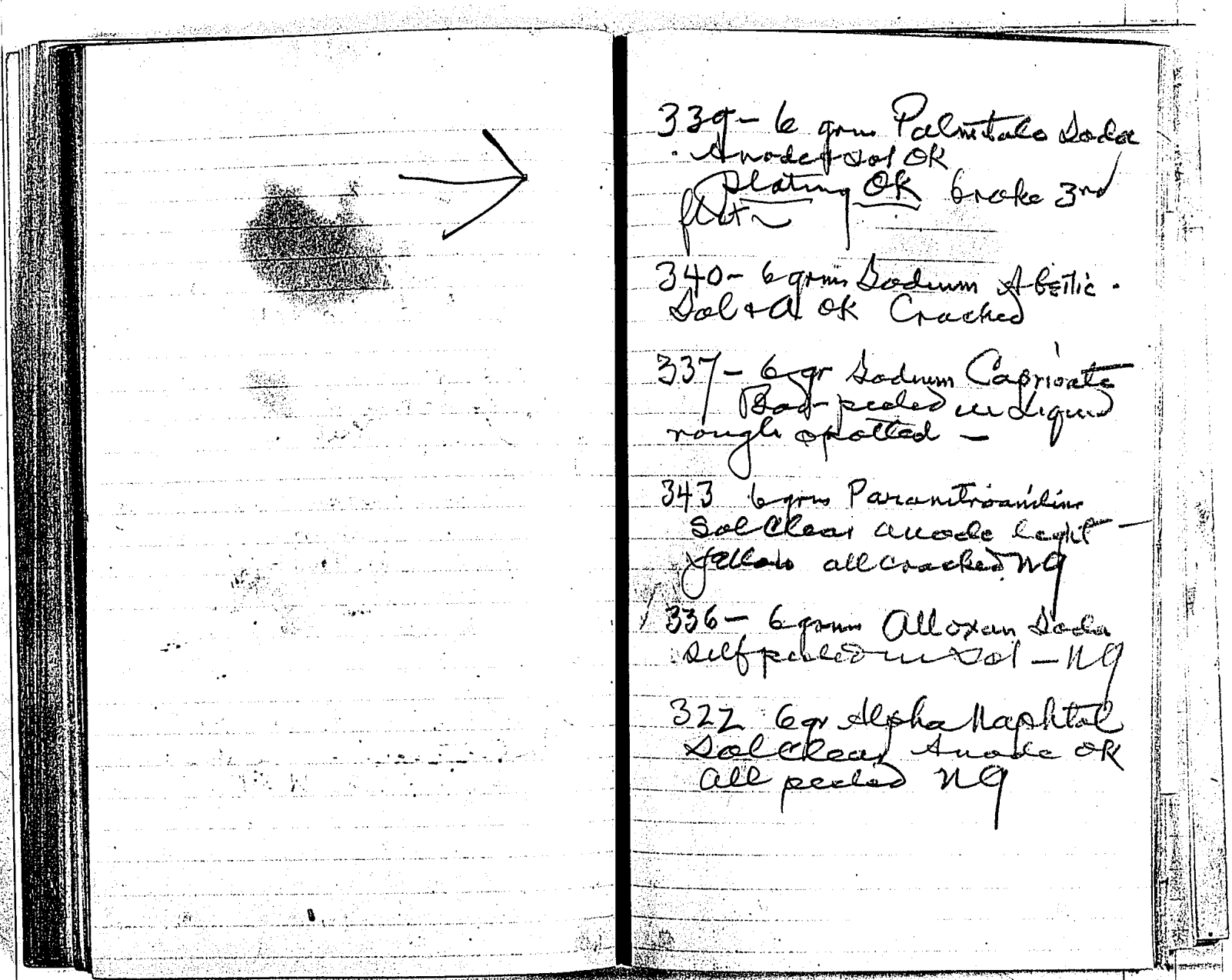
344 — 6 grm Bela Chloro of Wheeler Sediment Quit, Anode + Sol Clear Slight Cracks at Edge, broke 1st band

345 — 6 grm Carbazotic Brown Sol. Anode little dark — Ni Very Thin precipitate only a blush NG —

353. 6 grm Glacial Acetic acid Anode + Sol OK Plating OK Thin — dead Matte

352. 6 grms Acetone Anode + Sol Clear Cracked from upward streaks NG

325 — 6 grms Resorcin — Anode darkish — NG



339 – 6 grm Palmitate Soda
Anode Sol OK
Plating OK broke 3rd
flat –

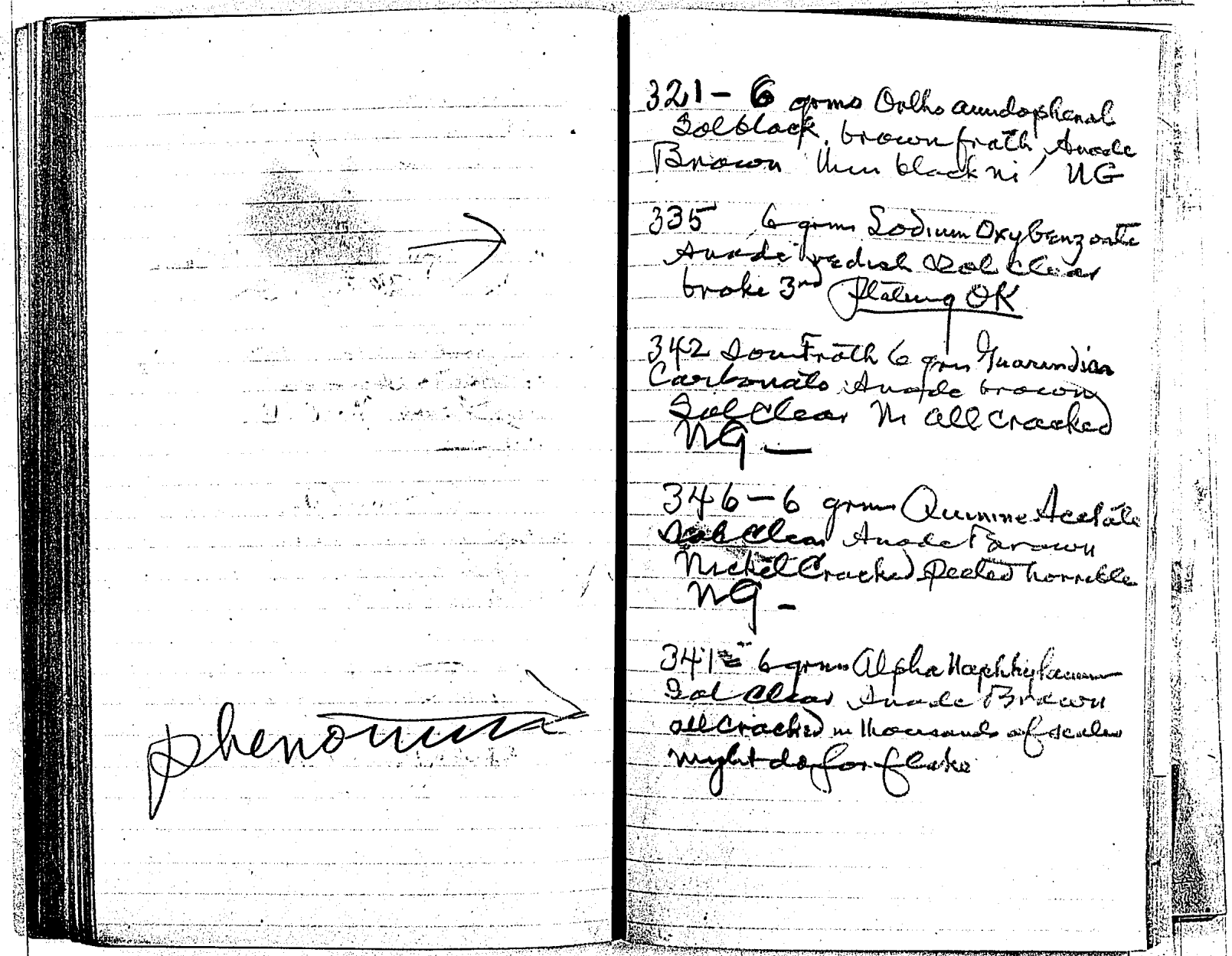
340 – 6 grm Sodium Abietic
Sol + A OK Cracked

337 – 6 gr Sodium Caprioate
Bad peeled in Liquid
rough spotted –

343 6 grm Paranitroaniline
Sol Clear anode Light –
yellow all cracked NG

336 – 6 grm Alloxan Soda
sulphate in Sol – NG

322 6 gr Alpha Naphtol
Sol Clear Anode OK
all peeled NG



321 – 6 grms Ortho amidophenol Sol black, brown froth, Anode Brown then black ni / NG

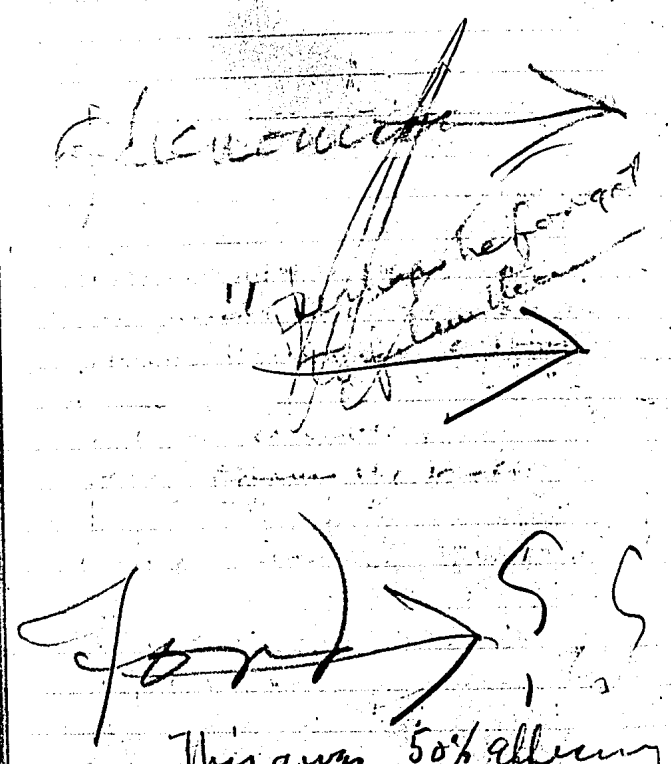
335 6 grms Sodium Oxybenzoate Anode yellowish Sol clear broke 3rd flaking OK

342 Lot froth 6 grms Guarundum Carbonate Anode brown Sol clear M all cracked NG –

346 – 6 grms Quinine Acetate Sol clear Anode Brown Nickel Cracked peeled horrible NG –

341 6 grms Alpha Naphthylamine Sol clear Anode Brown all cracked M thousands of flakes might do for flake

phenomenon



This gum 50% effluent
400 ma charge 10 sec
15 ma discharge
2 1/4 minutes

326 — 6 grms Benz Phenon
Oilflakes on top Rod
Anode OK NG —

350 — 6 grms Hexachlorethan
Anode Rod OK
~~Coat~~ Stripped OK
Plating perfect. broke 9th —

348 6 grms Monobromocamphor
Anode Rod OK Plating perfect
~~Coat~~ perfect plating
broke 8th bend

347 — 6 gr Paraendrotalcol
perfect. broke 4th bend —

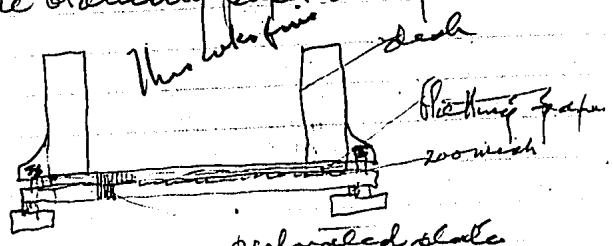
356 — 6 gr Cinnamate Soda
froth on top. anode tinted
dark red Sol cloudy
DEPOSITS NICE
adheres strongly
Sol cloudy
Duplicate charged only
Ni metal — Stripped OK
both Cracked Edge

349 6 grms Dipheny[illegible]
Sol Clear ditto Quake
~~[illegible]~~ Shaking perfect
Snake 8th - White Needle

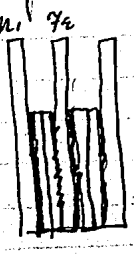
354 - Aniline Acetate 6 grms
Sol Black Quake OK
Mallocks Not Ng

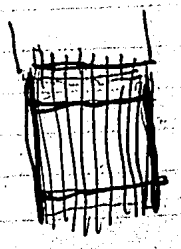
Ford 9th Sept 1919

I have found a good way to coat the blotting paper evenly with $NaOH_2$



Grind dried NaOH very fine make a thin Emulsion of it in water stirring continuously then suddenly pour whole into dish of which paper Paper forms the Gallon The $NaOH_2$ settles EVENly as water fallers thro the paper Thus leaves a beautiful Even coat of $NaOH_2$ all over the paper -





Sept 9th 1919

Experiments to find an Electrolyte for Lelande better than plain NaOH.

Dissolve recently precipitated $ZnOH_2$ in NaOH 25% Conductancy To 50 CC + 12 grms fusion Acetates Mg Na - NH_4 - Lime Ba Sr — also saturated Solutions alone of the above also saturated Sols of Alkaline phosphates Borates Silicates Chromates and Saturated Sols of Chlorates Chlorides, Nitrates Molybdates Tungstates Citrates + Stannates Antimoniates Sulphates Sulphites Alkaline Carbonates Tartrates Citrates

In 20% NaOH 12 grams Citrate Mg — Citrate K. Li Na Salol, Salicylates Trichloroacetates

375 – 6 grms Dimethylamido azobenzol
Anode Sol OK Cracked Edges
1 Hour NG

376 – 1 Hour – 3 grms Paranitroaniline
anode Reddish Sol clear black
deposit thin NG

372 1 Hour 6 grms Meta Toluylen
Diamine brown Sol dark
Anode black froth
part metal part black deposit
NG

373 – 1 Hour 6 grms Paramidothioeresol
froth – Sol black anode clean
black deposit NG

374 – 1 Hour 6 grms Haematine
froth anode dark red Vi Cracked
NG

377 – 1 Hour – 3 grms Mono Alpha Nitro
Naphthalene – Sol Anode OK
peeled off in pcs NG

Dup 3 Hours 274 Mg Citrate
8 grammes 8 bends

274 — 16 grms 11 bends 2 Mg Citrate
3 Hours.

274 — 4 gr Mg Citrate 1 corner free,
3 Hours

274 - 12 grm Mg Citrate, 8 bends
all good & flat, seem thick —

269 — 8 grm Cobalt Citrate
Scarcely any deposit, dark
streak 3 Hours.

269 2 grm Cobalt Citrate,
Scarcely any deposit, none in
Centre 3 Hours

367 - 1 hour Agobeng of the Dreschlorate
Anode coat ok Cathode coat
get off NG

369 - 1 hour Nitroquanadine
Anode brown - Steel clean
black plating NG

382 - 1 hour 6 phenorosorcin
float on top — all cracked
NG —

366 - 1 hour froth Orthotolidin
Sol dark brown Anode brown
plating NG —

358 1 hour 6 Meta Nitro aniline
Sol cloudy Anode brown
Cracked off NG

357 - 1 hour 6 — Monomethyl paramidophenol
froths bad Anode brown
no deposit, dark —

Great →

Experiments with the Solutions saved from Ni plating Experiments —

In which Copper Sulphate probably 5@10% to decolorize the Solution to see if Can get good Nickel deposit in presence of the Copper —

#77 - With 12 gr Citrate soda + 5@10% CuSO4 in Saturated Ni SO4

With 3 cells 200 ma - Nickel deposits OK — with 1 cell + 25 Ma Copper deposits out OK on the Nickel - I also find that with 2 cells ESB at only Copper deposits out no Ni —

I added very much more Copper Sulphate 25 Ma Copper only deposits Am using a Nickel Anode (not plated)

I now put on 3 cells and 200 Ma amp - Nickel is dark + poor with so much Cu in —

Think with 1/2 the CuSO4 it will work OK

I find that 3 cells can be used all the time & Ni anode used by using 25 ma only Copper deposited by regulating Carbon Rheostat to 200 ma Nickel is the deposit but of course Copper is also deposited but to the Nickel color very little Copper is in it but if too much Copper is in bad it darkens & affects the Nickel makes deposit dark & bad —

Perhaps in going over all the solutions I can use heavy amounts of $CuSO_4$ & still plate out good Nickel — This Sol is OK for moderate amounts

Dup 118 — 8 gms Acetate Soda in 250 cc Sat $NiSO_4$ 10 cc Saturated $CuSO_4$ — deposits Ni dark with 200 MA — 3 cells This dont seem to work as well as 129 Citrate Soda

Perhaps 10cc CuSO4 is more than I put in the first experiment,

I better make 10 cc CuSO4 the standard until I get one that with 10 cc plates good Naked as Copper plates out fine —

I poured out 1/2 the Dep & filled up with water to see what Ni would do

296 — 10 cc CuSO4 —
200 ma Ni 25 Cu / K Citrate
~ 1st Ni deposit not bright, Cu deposit red & bad

302 — 10 cc Saturated CuSO4
200 ma Ni OK - 20 ma Cu OK — 1st Coats —
2nd Coat Ni dark NG

134 — 10 cc CuSO4, There is a big precipitate when Col as it dont look to be a practicable one to work with — 1st Ni OK 1st Cu —

I suspect that I should plate Cu at 15 MA instead of 25 MA & see what doing

177 – 6 Ammonium Oxalate –
10 cc $CuSO_4$ → Ng – 1st
Ni Coat on Copper dark NG –

137 – 3 gm Lithium Tartrate, Ng
dark Ni

145 – 4 g Lithia Sulfate
Ng Ni dark Ng

294 – 6 gm K Oxalate –
Ni dark Ng

301 – Mg Acetate 5 hour run
This works fairly well but
some gas comes off Cathode –
Ni not bright

I took Reg $NiSO_4$ Conc + added
a Conc Sol of Mg acetate
this works really fair still
Ni is not bright enough
it is neutral = I may
make it acid by adding
acetic – it has 10 cc $CuSO_4$
it seems to work nearly as well

acid as neutral but the brightness of Ni is greater in Neutral—

1/2 Saturated Acetate Mag + 1/2 Conc $NiSO_4$ - Neutral doesn't do any better than Conc $NiSO_4$ with 10 to 12 grms acetate Mag + neutral with 10 cc $CuSO_4$ in fact not so well—

123 — 10cc $CuSO_4$ formate Magnesium + Ng in dark—

170 — 10cc $CuSO_4$ about same as best of all in preceding gets darker as deposit gets thicker to acid.—

276 — Ng — 10cc $CuSO_4$

173 — 6 gr Ammonia Bromide Ni deposit black Ng shows must have a Hydrogen absorber to work at all

Pretty Good,

Note—

297 — 6 gr Sodium Acetate
This is better than most
12 Citrate I think was
better — with 5 cc Cu SO4
this might work possibly
wants more acetate soda
Day 12 grms — Can plate
2 of 3 cycles with this pretty
fair — Ni that as bright as it should
be. — This Solution
acid — Perhaps if neutral
would work better —
well neutralize after few
more cycles

I made it less acid but did not
get it neutral used NaOH a
much precipitate & cracked —
also had it 1/2 hour on hot
plate. 1st Ni plating fairly
bright — Sol is worth trying
120 Volts perhaps less —
This is a good Sol. Use 50 ma
for Cu + 1 amp for Ni —
Think could make 50 cycles
or more — Work on
acetate soda —

Ford- from chart

#32	75 grms	$NiNO_3$ alone	
122	6 "	Magnesia Nitrate	poor
102	6 "	Aluminium Bromide	
103	6 "	Aluminium Chloride	
259	6 "	Zinc Bromide	
165	6 "	Cobalt Nitrate	
264	6 "	Sodium Nitrite	
3	6 "	Chromous Sulphate	
25	6 "	Sodium Metaphosphate	
258	6 "	Zinc Salicylate	
104	6	Aluminium Nitrate	28th Aug 1919

Disc, good plating

10 -	6 grms	Boric acid	
1	6 "	Sulphate Alumina	
13	6 "	Na Silicofluoride	
55	6 "	Ammonia Alum	
77	6 "	Citrate Soda	
118	6 "	Magnesia Acetate	
136	6 "	Lithia Citrate	
274	6 "	Magnesia Citrate	
269	6 "	Cobalt Citrate	
173	6 "	Ammonia Bromide	
137	6 "	Lithia Tartrate	
87	6 "	Nickel Acetate	28 Aug 1919
297	6 "	Sodium Acetate	flatest yet